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OFFICE OF
RESEARCH AND DEVELOPMENT

PROGRAM GUIDE

FISCAL YEAR 1978

October 1977 - September 1978

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

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The Program Guide provides the public with information on the Office of Research and Development's current extramural research program and serves as a guide to Office of Research and Development's key personnel. This publication will be updated each fiscal year.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
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OFFICE OF RESEARCH AND DEVELOPMENT
PROGRAM GUIDE

Introduction

The U.S. Environmental Protection Agency (EPA) was established in December of 1970 and was charged with a single overall mission—the protection and enhancement of the environment. The Agency was created by Presidential Reorganization Order involving the transfer and integration of 15 separate units of previously existing agencies. A single organizational entity was thereby established for the control of environmental pollution, drinking water quality, environmental radiation and noise, solid wastes, pesticides, and other toxic substances. The purpose was to mount an integrated national attack on environmental pollution and to allow progression toward a full understanding of the total environment as a single system consisting of separate but interrelated parts.

The Office of Research and Development (ORD) functions as the principal scientific component of EPA. Its fundamental role is to produce scientific data and technical tools on which to base sound national policy in the development of effective pollution control strategies and the promulgation of adequate and viable environmental standards.

ORD's research is supplemented by general scientific and technical research in other federal agencies, colleges and universities and elsewhere. ORD also supports the Agency's involvement in many international organizations with mutual environmental research and development (R&D) concerns.

More general functions of ORD include: (1) maintenance of in-house expertise capable of quickly responding to emergencies and giving expert consultation and testimony when necessary; (2) sharing the results of environmental R&D with a wide range of individuals, groups, and agencies in ways that are meaningful and practical; and (3) giving expert scientific and technical assistance to other EPA offices to help them formulate environmental policy.

Specific authority for the conduct of EPA's research and development programs, including research support for environmental aspects of energy development, is included in the annual appropriation acts and the following legislation.

Clean Air Act, as amended (P.L. 95–95)
Federal Water Pollution Control Act, as amended (P.L. 92–500)
Safe Drinking Water Act (P.L. 93–523)
Federal Insecticide, Fungicide and Rodenticide Act, as amended (P.L. 92–516)
Public Health Service Act, as amended (P.L. 78–410)
Noise Control Act (P.L. 92–574)
Toxic Substances Control Act (P.L. 94–469)
National Environmental Policy Act (P.L. 91-190)
Marine Protection, Research and Sanctuaries Act (P.L. 92–532)
Resource Conservation and Recovery Act (P.L. 94–580)
Environmental Research, Development and Demonstration Authorization Act (P.L. 94–475)

The purpose of this Program Guide is three-fold: First, to acquaint the research and development community with the organizational structure of the Office of Research and Development — PART I; second, to make public

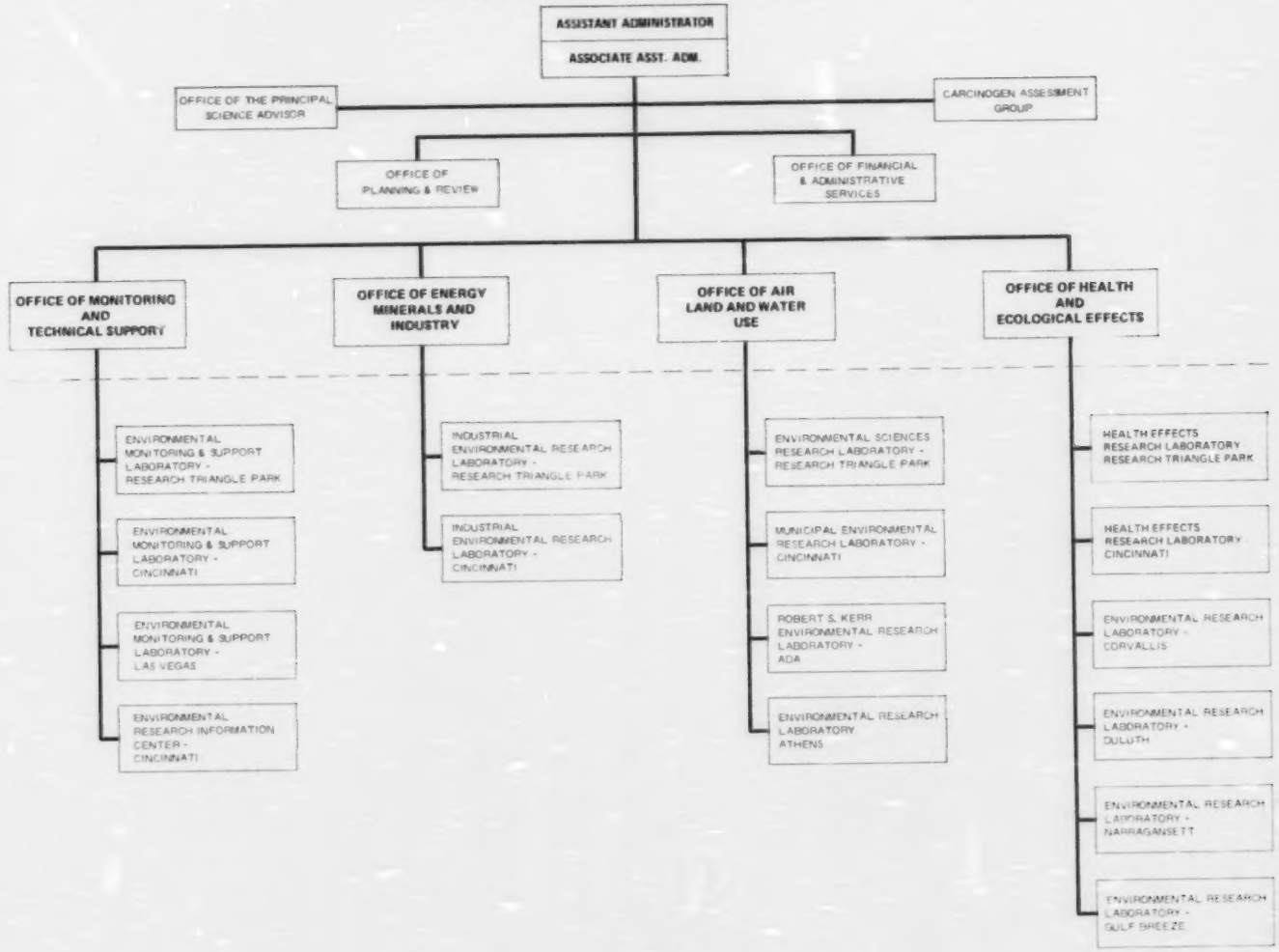
the Office of Research and Development's extramural research program objectives for fiscal year 1978 — PART II; and third, to provide general guidelines necessary when developing grant or contract applications — PART III.

Hand out copies of this Program Guide are available from the EPA's ten regional offices (see Appendix D), from ORD's fifteen associated laboratories throughout the country, and from the Office of Research and Development, Headquarters, Washington, DC. Mail requests should be sent to:

Office of Financial & Administrative Services (RD-674)
Office of Research and Development
Environmental Protection Agency
Washington, DC 20460

Anyone wishing to receive future editions of this Program Guide should complete and return the form located at the back of this publication (Appendix D).

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT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OFFICE OF ENERGY MINERALS AND INDUSTRY
OFFICE OF AIR LAND AND WATER USE
OFFICE OF HEALTH AND ECOLOGICAL EFFECTS
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ENVIRONMENTAL MONITORING & SUPPORT LABORATORY - LAS VEGAS
ENVIRONMENTAL RESEARCH INFORMATION CENTER - CINCINNATI
INDUSTRIAL ENVIRONMENTAL RESEARCH LABORATORY - RESEARCH TRIANGLE PARK
INDUSTRIAL ENVIRONMENTAL RESEARCH LABORATORY - CINCINNATI
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MUNICIPAL ENVIRONMENTAL RESEARCH LABORATORY - CINCINNATI
ROBERT S. KERR ENVIRONMENTAL RESEARCH LABORATORY - ADA
ENVIRONMENTAL RESEARCH LABORATORY ATHENS
HEALTH EFFECTS RESEARCH LABORATORY - RESEARCH TRIANGLE PARK
HEALTH EFFECTS RESEARCH LABORATORY CINCINNATI
ENVIRONMENTAL RESEARCH LABORATORY - CORVALLIS
ENVIRONMENTAL RESEARCH LABORATORY - DULUTH
ENVIRONMENTAL RESEARCH LABORATORY - NARRAGANSETT
ENVIRONMENTAL RESEARCH LABORATORY - GULF BREEZE

PART I

OFFICE OF RESEARCH AND DEVELOPMENT
ORGANIZATIONAL DIRECTORY

The Office of Research and Development is responsible for the development, direction, and conduct of a national research, development, and demonstration program in pollution sources, fate, and health and welfare effects; waste management and utilization technology; environmental sciences; and monitoring systems. The Assistant Administrator for Research and Development also serves as principal science advisor to the Administrator and coordinator for the Agency's policies and programs concerning carcinogenesis and related problems.

	Headquarters Mail Code*	Telephone**
Assistant Administrator for Research and Development **Stephen J. Gage, Acting**	RD-672	(202) 755–2600
Associate Assistant Administrator Carl R. Gerber	RD-672	(202) 755–0122
Office of Financial and Administrative Services Director, Alan Neuschatz	RD-674	(202) 426–2355
Office of Planning and Review Director, Samuel Rondberg, Acting	RD-675	(202) 755–2606
Office of the Principal Science Advisor Principal Physical Science Advisor, Herbert Wiser	RD-676	(202) 755–0477
Principal Engineering Advisor, William Lacy	RD-676	(202) 755–0464
Senior ORD Official, Cincinnati David G. Stephan		(513) 684–4402
Support Services Office – Cincinnati Director, Robert N. Carr		(513) 684–7966
Environmental Protection Agency Cincinnati, OH 45268		
Senior ORD Official, Research Triangle Park John K. Burchard		CML (919) 541–2111 FTS 629–2821
Support Services Office – RTP Director, Paul A. Kenline		CML (919) 541–2111 FTS 629–2613
Environmental Protection Agency Research Triangle Park, NC 27711		

Office of Monitoring and Technical Support

The Office of Monitoring and Technical Support is responsible for the development and demonstration of monitoring systems; quality control of pollutant measurement and monitoring techniques (quality assurance); technical information dissemination; and technical support services.

	Headquarters Mail Code*	Telephone**
Deputy Assistant Administrator **Albert C. Trakowski, Jr.**	RD-680	(202) 426-2202
Associate Deputy Assistant Administrator H. Matthew Bills	RD-680	(202) 426-4453
Program Operations Staff Director, Ross K. Robeson	RD-680	(202) 755-6403
Regional Services Staff Director, Michael L. Mastracci	RD-680	(202) 755-9210
Monitoring Technology Division Director, Charles Brunot	RD-680	(202) 426-2026
Technical Support Division Director, William A. Cawley	RD-680	(202) 426-2382
Technical Information Division Director, W. Randall Shobe	RD-680	(202) 245-3018
Environmental Research Information Center Director, Robert Crowe Environmental Protection Agency Cincinnati, OH 45268		(513) 684-7391
Environmental Monitoring and Support Laboratory **Director, Thomas Hauser**		CML (919) 541-2111 FTS 629-2106
Deputy Director, (Vacant) Environmental Protection Agency Research Triangle Park, NC 27711		CML (919) 541-2111 FTS 629-2106

OFFICE OF RESEARCH AND DEVELOPMENT
ORGANIZATIONAL DIRECTORY

	Telephone**
Environmental Monitoring and Support Laboratory	
Director, Dwight G. Ballinger	(513) 684–7301
Deputy Director, Robert L. Booth	(513) 684–7301
Environmental Protection Agency Cincinnati, OH 45268	
Environmental Monitoring and Support Laboratory	CML (702) 736–2969
Director, George B. Morgan	FTS 595–2969
Deputy Director (Vacant)	
Environmental Protection Agency P. O. Box 15027 Las Vegas, NV 89114	
Vint Hill Field Station P. O. Box 1587 Building 166 Warrenton, VA 22186	(703) 347–6224

OFFICE OF RESEARCH AND DEVELOPMENT
ORGANIZATIONAL DIRECTORY

Office of Energy, Minerals, and Industry

The Office of Energy, Minerals, and Industry is responsible for the assessment and the development of methods for control of the environmental and socio-economic impacts of energy and mineral resource extraction, processing, conversion, and utilization systems and of other industrial operations.

	Headquarters Mail Code*	Telephone**
Deputy Assistant Administrator **Stephen J. Gage**	RD-681	(202) 755–4857
Associate Deputy Assistant Administrator Steven R. Reznek	RD-681	(202) 755–4857
Program Operations Staff Director, Everett Lemley	RD-681	(202) 426–2507
Energy Coordination Staff Director, Clinton W. Hall	RD-681	(202) 426–4567
Energy Processes Division Director, Frank T. Princiotta	RD-681	(202) 755–0205
Industrial and Extractive Processes Division Director, Kurt Jakobson (Acting)	RD-681	(202) 755–9014
Industrial Environmental Research Laboratory **Director, John K. Burchard**		CML (919) 541–2111 FTS 629–2821
Deputy Director, Norbert Jaworski		CML (919) 541–2111 FTS 629–2821

Environmental Protection Agency
Research Triangle Park, NC 27711

OFFICE OF RESEARCH AND DEVELOPMENT
ORGANIZATIONAL DIRECTORY

	Telephone**
Industrial Environmental Research Laboratory **Director, David G. Stephan**	(513) 684-4402
Deputy Director, (Vacant)	(513) 684-4438
Environmental Protection Agency 5555 Ridge Avenue Cincinnati, OH 45268	
Oil and Hazardous Materials Spills Branch, Edison, NJ Environmental Protection Agency Edison, NJ 08817	CML (201) 321-6600 FTS 340-6600
Extraction Technology Branch, Rivesville, WV P. O. Box 5555 Rivesville, WV 26588	CML (304) 278-5376 FTS 923-7496
Food and Wood Products Branch, Corvallis, OR 200 SW 35th Street Corvallis, OR 97330	CML (503) 752-4211 FTS 420-4694

OFFICE OF RESEARCH AND DEVELOPMENT
ORGANIZATIONAL DIRECTORY

Office of Air, Land, and Water Use

The Office of Air, Land, and Water Use is responsible for the development and demonstration of cost-effective methods for the prevention or management of pollutant discharge or waste disposal into the environment, except those related to energy, minerals, or industrial processes.

	Headquarters Mail Code*	Telephone**
Deputy Assistant Administrator **Thomas A. Murphy**	RD-682	(202) 426-0803
Associate Deputy Assistant Administrator (Vacant)	RD-682	(202) 426-0803
Program Operations Staff Director, William Frietsch	RD-682	(202) 426-4255
Agriculture and Non-Point Source Management Division Director, Darwin R. Wright	RD-682	(202) 426-2407
Waste Management Division Director, William Rosenkranz	RD-682	(202) 426-2260
Media Quality Management Division Director, Courtney Riordan	RD-682	(202) 426-1532
Environmental Sciences Research Laboratory **Director, A. Paul Altshuller**		CML (919) 541-2111 FTS 629-2191
Deputy Director, Alfred Ellison		CML (919) 541-8411 FTS 629-2191
Environmental Protection Agency Research Triangle Park, NC 27711		
Regional Air Pollution Study Field Office 11640 Administration Drive St. Louis, MO 63141		CML (314) 425-7022 FTS 279-7022

OFFICE OF RESEARCH AND DEVELOPMENT
ORGANIZATIONAL DIRECTORY

	Telephone**
Municipal Environmental Research Laboratory **Director, Francis T. Mayo**	(513) 684–7951
Deputy Director, Louis W. Lefke	(513) 684–7953
Environmental Protection Agency Cincinnati, OH 45268	
Lebanon Pilot Plant Route 2, Box 7-A Glosser Road Lebanon, OH 45036	CML (513) 932–4951 FTS 684–2000, ask for (513) 932–4951
Robert S. Kerr Environmental Research Laboratory **Director, William C. Galegar**	CML (405) 332–8800 FTS 743–2224
Deputy Director, Marvin L. Wood	CML (405) 332–8800 FTS 743–2226
Environmental Protection Agency P. O. Box 1198 Ada, OK 74820	
Environmental Research Laboratory **Director, David W. Duttweiler**	CML (404) 546–3134 FTS 250–3134
Deputy Director, Henry F. Enos	CML (404) 546–3430 FTS 250–3430
Environmental Protection Agency College Station Road Athens, GA 30601	

OFFICE OF RESEARCH AND DEVELOPMENT
ORGANIZATIONAL DIRECTORY

Office of Health and Ecological Effects

The Office of Health and Ecological Effects is responsible for the development of health and ecological data needed for the establishment of standards and criteria or guidelines for those components of the environment in which specific pollutants or activities may require control.

	Headquarters Mail Code*	Telephone**
Deputy Assistant Administrator **Delbert Barth**	RD-683	(202) 755-0820
Associate Deputy Assistant Administrator Andrew McErlean	RD-683	(202) 755-0638
Program Operations Staff Director, (Vacant)	RD-683	(202) 755-0611
Stratospheric Modification Research Staff Director, Alphonse Forziati	RD-683	(202) 245-3027
Health Effects Division Director, George G. Armstrong, M.D.	RD-683	(202) 755-9723
Ecological Effects Division Director, David A. Flemer	RD-683	(202) 755-0649
Criteria Development and Special Studies Division Director, Roger S. Cortesi	RD-683	(202) 426-4637
Health Effects Research Laboratory **Director, John H. Knelson, M.D., Acting**		CML (919) 549-8411 FTS 629-2281
Deputy Director, Robert E. Lee, Jr.		CML (919) 549-8411 FTS 629-2281
Environmental Protection Agency Research Triangle Park, NC 27711		
Wenatchee Research Station P. O. Box 73 Wenatchee, WA 98801		CML (504) 663-0031 FTS 446-0243

OFFICE OF RESEARCH AND DEVELOPMENT
ORGANIZATIONAL DIRECTORY

	Telephone**
Health Effects Research Laboratory **Director, John Garner**	(513) 684–7401
Deputy Director, James Lucas, M.D.	(513) 684–7401
Environmental Protection Agency Cincinnati, OH 45268	
Recreational Water Quality Criteria Group Environmental Protection Agency South Ferry Road Narragansett, RI 02882	CML (401) 789–1071 FTS 838–4843
Environmental Research Laboratory **Director, A. F. Bartsch**	CML (503) 757–4601 FTS 420–4601
Deputy Director, Earl Kari	CML (503) 757–4601 FTS 420–4601
Environmental Protection Agency 200 SW 35th Street Corvallis, OR 97330	
Newport Field Station Marine Science Center Newport, OR 97365	CML (503) 867–4031 FTS 423–4111, ask for (503) 867–4031
Ely Field Station 222 West Conan Street Ely, MN 55731	CML (218) 365–5280 FTS 725–4242, ask for (218) 365–5280
Western Fish Toxicology Station 1350 SE Goodnight Avenue Corvallis, OR 97330	CML (503) 757–4735 FTS 420–4735
Arctic Environmental Research Station College, AK 99701	CML (907) 479–7728 FTS 399–0150, ask for (907) 479–7728

OFFICE OF RESEARCH AND DEVELOPMENT
ORGANIZATIONAL DIRECTORY

	Telephone**	
Environmental Research Laboratory **Director, Donald I. Mount**	CML (218) FTS	727–6692 783–9550
Deputy Director, David Yount	CML (218) FTS	727–6692 783–9549
Environmental Protection Agency 6201 Congdon Boulevard Duluth, MN 55804		
Newtown Fish Toxicology Station 3411 Church Street Cincinnati, OH 45244	(513)	684–8601
Monticello Field Station Box 500 Monticello, MN 55362	CML (513) FTS None	295–5145
Large Lakes Research Station 9311 Groh Road Grosse Ile, MI 48138	CML (313) FTS	675–5000 226–7811
Environmental Research Laboratory **Director, Eric D. Schneider**	CML (401) FTS	789–1071 838–4843
Deputy Director, Frank G. Lowman	CML (401) FTS	789–1071 838–4843
Environmental Protection Agency South Ferry Road Narragansett, RI 02882		

OFFICE OF RESEARCH AND DEVELOPMENT
ORGANIZATIONAL DIRECTORY

	Telephone**
Environmental Research Laboratory	CML (904) 932–5311
Director, Thomas W. Duke	FTS None
Deputy Director, Tudor Davies	CML (904) 932–5311
	FTS None
Environmental Protection Agency Sabine Island Gulf Breeze, FL 32561	
Bears Bluff Field Station Box 368 Johns Island, SC 29455	CML (803) 559–0371 FTS 577–4171, ask for (803) 559–0371

*The Office of Research and Development Headquarters mailing address is — Environmental Protection Agency, Washington, DC 20460. Headquarters mail should also include the Mail Code.

**Telephone numbers are both commercial and Federal Telecommunications System (FTS) unless otherwise indicated.

PART II

OFFICE OF RESEARCH AND DEVELOPMENT FISCAL YEAR 1978 RESEARCH PROGRAM

The Office of Research and Development (ORD) establishes its objectives and priorities in response to the overall mission and priorities of EPA and is highly mission-oriented, concerned with solving specific priority problems rather than only advancing scientific knowledge. Although the scope of ORD projects may vary from quite fundamental research to the full-scale engineering demonstration of new pollution control processes, all projects are directed at meeting specified objectives. While unsolicited proposals and grant applications may be submitted on any subject at any time (see Part III), all these proposals will be evaluated in the context of these pre-established research objectives.

In ORD's planning process research objectives are grouped into five major program areas. These are: Health and Ecological Effects, Energy/Environment, Industrial Processes, Public Sector Activities, and Monitoring and Technical Support. Each program area is further divided into one or more subprogram areas or program elements. The relationship between ORD's planning structure and EPA's budget structure is shown in Appendix A.

After research objectives have been defined and approved by ORD and other Agency components, they are formally documented by ORD in planning documents called "Accomplishment Plans." Each Accomplishment Plan summarizes a specific research objective to be pursued by one or more of ORD's fifteen laboratories. While these Accomplishment Plans describe the research objectives desired, they do not contain detailed information on the individual mechanisms or projects required to attain the desired results. This detailed planning is the responsibility of the Laboratory Director.

The following pages in Part II describe all fiscal year 1978 Accomplishment Plans which have funds reserved that will be expended through the grant or contract process. The laboratory or laboratories responsible for each Accomplishment Plan are shown. Contact with ORD's laboratories concerning these plans and objectives is encouraged.

HEALTH AND ECOLOGICAL EFFECTS PROGRAM AREA

The Health and Ecological Effects Program Area is fundamental to EPA's responsibility to set criteria, standards and guidelines to protect and enhance environmental quality. Scientific information which delineates the effects of pollutants on human health and ecosystem structure is essential to the development of environmental quality standards and effective pollution control strategies. The link between the existence of a damaging pollutant and the way it entered the environment must also be understood by policy-makers. Research on pollutant transport and fate is essential in order to set control requirements for specific sources.

The Health and Ecological Effects Program also provides information for establishment and reevaluation of water quality criteria, air quality criteria, ocean disposal criteria, pesticide registration guidelines, effluent standards for toxic and hazardous materials and radiation standards. This program contains four subprograms: Health Effects, Ecological Processes and Effects, Transport and Fate of Pollutants, and Stratospheric Modification.

HEALTH EFFECTS SUBPROGRAM

Health effects research is directed toward the assessment of health hazards associated with environmental pollution in a number of media and categories including air, water, pesticides, radiation, etc. Within this program, research problems are classified on the basis of exposure, or the way in which pollutants reach man. In taking environmental action to protect human health, exposure to specific contaminants, not effect, is regulated. Three primary categories are used in the problem classification: "Air Exposures and Their Effects" which deals with contaminants reaching man primarily in air, "Water Exposures and Their Effects" which deals with contaminants reaching man primarily in water, and "Multi-Route Exposures and Their Effects" which addresses pollutants which commonly reach man by a variety of routes of exposure.

Air Exposures & Their Effects: Refinement of Public Health Risk Assessment on Pollutants Specifically Associated With Transportation — 601B

Extramural Funds: $1,356,000

Accomplishment Plan Summary: This is a multidisciplinary research program begun in fiscal year 1975 focusing on the public health consequences of non-regulated pollutants from mobile sources. The program is designed to provide timely decision-making input regarding sulfuric acid and other pollutants from mobile sources as promised by the Administrator to the Congress in November 1973. The emphasis is on the evaluation of unregulated emissions from advanced automotive control systems (principally, but not restricted to, catalysts) so as to ensure protection of the public health and welfare.

Four ORD laboratories perform research on automobile emissions. They are:

(1) Environmental Sciences Research Laboratory/Research Triangle Park—emissions characterization, measurement methods development for auto exhaust emissions, measurement methods development for ambient air, and dispersion models development for auto emissions.

(2) Environmental Monitoring and Support Laboratory/Research Triangle Park—ambient air measurement for catalyst equipped car reduction of air pollution, measurement methods standardization, quality assurance for entire catalyst program.

(3) Health Effects Research Laboratory/Cincinnati—animal toxicology using whole exhaust and pure components for acute, subacute and chronic studies.

(4) Health Effects Research Laboratory/Research Triangle Park—animal toxicology and controlled human exposure acute studies using pure components found in auto exhaust.

Laboratory Assignment: Environmental Sciences Research Laboratory, Research Triangle Park
Environmental Monitoring and Support Laboratory, Research Triangle Park
Health Effects Research Laboratory, Research Triangle Park
Health Effects Research Laboratory, Cincinnati

Air Exposures and Their Effects: Refinement of Public Health Information on Pollutants for Which Ambient Air Quality Standards Have Been Identified — 601C

Extramural Funds: $1,770,000

Accomplishment Plan Summary: Research is conducted to evaluate the adequacy of existing Ambient Air Quality Standards (AAQS) and to refine existing health criteria. Emphasis is directed toward: evaluation of exposure averaging times, adequacy of existing safety margins, determination of the health benefits of meeting and the health risks of exceeding the AAQS's on a time-weighted basis. Clinical studies will focus on refining dose/response characteristics of criteria pollutants and a minimal amount of indicator methodology development. Preponderance of resources are addressed to ozone and other components of the photochemical oxidant complex. Research effort on CO will plateau and diminish, as dose/response effects for that pollutant are refined. Toxicological studies will concentrate on the acquisition of dose-rate data for NO_2 to assist in providing a scientific foundation for the Agency's pending short-term NO_2 standard. A comparable effort will be directed toward assessing the interaction effects from exposures to combinations of SO_2, NO_2, O_3, PAN and particulates. Results from this research will be useful in the interpretation of epidemiologic data and in aiding the design of future chemical and epidemiological studies. Population and community studies are the most difficult to design and conduct, but are the most persuasive when well executed. Enhanced attention must be given to clearly targeted studies of this nature planned to answer specific questions. Of highest priority are studies addressing the question of relative contribution to observed disease consequences of oxides of sulfur and nitrogen. Studies utilizing more sophisticated health endpoints are being initiated. These community studies shall utilize the new generation of CHAMP stations for improved environmental assessment.

Laboratory Assignment: Health Effects Research Laboratory, Research Triangle Park

Air Exposures and Their Effects: Identification of the Health Implications of Exposure to Non-Criteria Pollutants Reaching Man Primarily in Air — 601D

Extramural Funds: $1,968,400

Accomplishment Plan Summary: One of the major objectives of the research to be undertaken in this plan is to supply scientific data useful for determining whether exposure to presently unregulated air pollutants should be restricted to protect health. Once an indication is available that exposure should be restricted, the next step is to provide information useful in determining the degree of control which is warranted. There is sufficient information available to be concerned about the health effects of exposure to sulfates, nitrates, and respirable particulates. The essential questions, then, concern the extent to which restricting exposure may be needed. The toxicology program will continue to evaluate specifically the relative toxicity of sulfuric acid, ammonium sulfates and sulfites which cannot be determined in either clinical or population studies. This portion of the program will

also develop more sensitive and relevant health indicators and dose-response data for selected sulfur oxide compounds.

Increased efforts in fiscal years 1978 and 1979 will provide for the expansion of controlled human exposure studies on various sulfates. The objective of these studies will be to determine the level of short-term exposure at which biochemical, physiological, and behavioral responses are observed in human subjects. Studies will start on healthy subjects who will be exposed to H_2SO_4, followed by studies exposing healthy subjects to ammonium bisulfate and ammonium sulfate. Studies will continue by exposing susceptible groups (i.e., asthmatics). These data will clarify which bio-indicators of response are most appropriate for epidemiological studies and will provide human dose-response data for specific compounds.

Laboratory Assignment: Health Effects Research Laboratory, Research Triangle Park

Multi-Route Exposures and Their Effects: Identification of the Health Effects of Non-Pesticide Substances Commonly Reaching Man by Multiple Routes of Exposure — 601E

Extramural Funds: $70,000

Accomplishment Plan Summary: In order to adequately protect human health by a variety of legal mechanisms available to EPA, research is needed which permits evaluation of the significance of individual route of exposure to observed effects. Such research is necessary in determining the most effective area of control for pollutants which are assulting humans through more than one environmental medium or reaching and adversely affecting vital metabolic processes through more than one human body system. The research, in order to solve these regulatory-related questions must evaluate total exposure, total body burden, and their associated health effects. This objective is directed toward discerning exposure and effect relationships to health from certain non-pesticide environmental contaminants which typically reach man by multiple routes of exposure. Relationships will be determined by assessing human body burden, performing studies of targeted populations, conducting toxicity studies to examine specific endpoints of elected effects and conducting teratologic investigations.

Laboratory Assignment: Health Effects Research Laboratory, Cincinnati

Multi-Route Exposures and Their Effects: Identification of the Health Effects of Non-Pesticide Substances Commonly Reaching Man by Multiple Routes of Exposure — 601E

Extramural Funds: $190,000

Accomplishment Plan Summary: Appropriate control strategies for pollutants reaching man through multi-media exposure must be based on information relating concentrations of pollutants in the total environment to specific biological endpoints. Research is needed to determine absorption, kinetics and toxicology of the various pollutants. Epidemiologic studies of high exposure populations are conducted both to determine relationships between exposure to environmental media and body burdens, and to identify and quantify resultant health implications. Current studies involve children in areas of high traffic density and persons of all ages residing in the vicinity of primary non-ferrous smelters. Studies of neuropsychologic performance in children with varying but asymptomatic metal burdens are complimented by animal studies of behavioral effects and the effects of age at exposure or absorption and retention of ingested heavy metals. Studies in laboratory animals, principally rodents and non-human primates, obtain dose-response data for heavy metals and other non-pesticide substances which

have been identified by epidemiological and other means as potentially harmful to humans. Chronic low level exposures and multigenerational studies are conducted to assess mutagenic, teratogenic, reproductive, enzymatic, neurophysiological and behavioral effects of these substances as well as their absorption, distribution, retention and excretion. Minimal in vitro investigations with cell cultures, microorganisms, mammalian ova, etc., evaluate the cytotoxicity, mutagenicity, carcinogenicity, and co-carcinogenicity of specific substances as well as crude environmental samples, and guide further laboratory and epidemiological study. Further investigation of carcinogenic activity, however, will be supported under the appropriate accomplishment plan.

Laboratory Assignment: Health Effects Research Laboratory, Research Triangle Park

Air Exposures and Their Effects: Assessment of the Contribution of Environmental Carcinogens to Cancer Incidence in the General Population — 601F

Extramural Funds: $1,143,000

Accomplishment Plan Summary: A long-term research program is proposed to provide information essential to the mission of the Agency to identify and control chemical agents in the air and water environment which may cause adverse public health and welfare effects. Chemical agents have been shown to be carcinogenic in animal studies, and in occupational cases, at concentration levels much higher than those found in the general population environment. It has been postualted that a large fraction of human cancer may be caused by chemical agents in the environment. If this is true, the human health benefit from identifying and controlling the responsible environmental agents is obvious. The proposed program is designed to: (1) provide a profile of known or suspect chemical carcinogens in the ambient air and drinking water, and (2) to assess the impact upon the frequency of occurrence of cancer in the general population resulting from environmental exposure. This will be accomplished through an integrated monitoring and health effects research program in areas where cancer rates are known to be abnormally higher than the National average, and in areas where current exposure levels to chemical agents are shown to be high. Accomplishment of the program will require a highly coordinated effort among a number of Federal agencies, as well as State and Regional Agencies. Detailed planning will be accomplished by Interagency Groups and formulated in Interagency Agreements. Categorical programs will be designed to cover areas of research important to the mission of EPA but not currently included in the overall National effort.

Laboratory Assignment: Environmental Sciences Research Laboratory, Research Triangle Park
Environmental Monitoring and Support Laboratory, Las Vegas
Health Effects Research Laboratory, Research Triangle Park
Environmental Research Laboratory, Gulf Breeze

Air Exposure and Their Effects: Assessment of the Contribution of Environmental Carcinogens to Cancer Incidence in the General Population — 601F

Extramural Funds: $160,000

Accomplishment Plan Summary: The basic objective of this effort is to provide EPA with a systematic program which can provide an assessment of the contribution of environmental carcinogens to the incidence of cancer in the general population. The thrust of this research activity is to assess the carcinogenic potential in experimental animal models of environmental contaminants.

Because of the low level of environmental contaminants and the consequent low levels of possible carcinogenic responses, an approach must be utilized which will detect environmental carcinogens at an early stage of exposure to human population. Such an approach requires a strong foundation in molecular biology including the metabolism of the genome, in comparative metabolism, and in the development and application of predictive toxicologic models. Models for the prediction of chemical carcinogenesis in man are relatively poorly defined. Problems exist in the extrapolation from species to species as well as from high to low dose levels. Extensive research should continue on validating various models from the point of view of comparative biochemistry, physiology, anatomy, and pathology. Such endeavors must be integrated within a toxicologic framework in order to ensure proper understanding and utilization of the information. Programs in this area should be aimed at not only the identification of tumorous lesions but also at the understanding of dose-response phenomena, at the functionality of hierarchical pathogenic lesions and at the understanding of the chemical/biological interactions required to initiate and sustain such neoplastic lesions.

Laboratory Assignment: Health Effects Research Laboratory, Cincinnati

Preparation of Criteria Documents and Other Scientific and Technical Assessment Reports — 601G

Extramural Funds: $388,000

Accomplishment Plan Summary: The objective of this Accomplishment Plan is the preparation and ultimate publication of: Air Quality Criteria Documents, revised Air Quality Criteria Documents, Scientific and Technical Assessment Reports, and Assessment Documents. Criteria documents Other documentation provides partial bases for decisions on pollutant control, method(s) of control and the level of control.

Laboratory Assignment: Health Effects Research Laboratory, Research Triangle Park

Water Quality Health Effects: Health Effects Associated With the Treatment and Disposal of Wastewater and Sludge — 607A

Extramural Funds: $1,340,000

Accomplishment Plan Summary: This program is designed to support the Agency's efforts in municipal wastewater and sludge control. This research program will determine the health implications of existing technology for treatment and disposal of wastewater and sludge, as well as foreseeing any health risks that may be associated with innovative technology. The emphasis will be on the health effects associated with the application of wastewater and sludge on agricultural land. In addition to determining the health effects associated with passage of contaminants through the food chain and to the neighbors of treatment and disposal facilities, interim criteria associated with the operations will be recommended. Current practice results in sixty percent of municipal sludges being placed on land.
The Federal Water Pollution Control Act (PL 92–500) and Agency policy require that land application of wastewater be considered as a viable alternative to municipal wastewater treatment plants. This emphasis on the use of land places a responsibility on EPA to ensure that the methods used do not result in the creation of health hazards.

Laboratory Assignment: Health Effects Research Laboratory, Cincinnati

HEALTH AND ECOLOGICAL EFFECTS PROGRAM AREA
HEALTH EFFECTS SUBPROGRAM

Characterization and Testing of Water and Hazardous Substances — 607B

Extramural Funds: $1,260,000

Accomplishment Plan Summary: The purpose of this program is to develop rapid screening tests for characterizing toxic pollutants. The program will be supportive of the Federal Water Pollution Control Act (PL 92–500) and the development of protocols needed to implement the Toxic Substances Control Act (PL 94–469). Specific objectives will be to: (1) Develop methods and approaches to identify and characterize classes of pollutants; (2) Develop tests for the assessment of biological impact of substances in living organisms; and (3) Apply these tests to complex effluents.

Laboratory Assignment: Health Effects Research Laboratory, Cincinnati

Water Quality Health Effects: Development of Criteria for Recreational and Shellfish-Growing Waters — 607C

Extramural Funds: $360,000

Accomplishment Plan Summary: It is a mandated goal of the Federal Water Pollution Control Act (PL 92–500) that "wherever attainable, the interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1983." In support of this National goal, this program will provide the health effects data and technology required in setting guidelines on a plant by plant basis for the discharge of sewage effluents into the aquatic environment by: (1) Developing health effects recreational water quality criteria for marine waters; (2) Developing health effects water quality criteria for fresh waters; and (3) Developing health effects water quality criteria for shellfish-growing areas.

Laboratory Assignment: Health Effects Research Laboratory, Cincinnati

Multi-Route Exposures and Their Effects: Determination of the Health Implication of Substances Used as Pesticides — 615A

Extramural Funds: $964,000

Accomplishment Plan Summary: The pesticide health effects research program is designed to support the Agency's activities with respect to meeting legally mandated responsibilities for pesticides which include registration, label reviews, hazard classification, and tolerance setting. Thus, objectives of the pesticide research are: (1) to investigate the potential health effects (hazards) of the major classes of pesticides now registered by EPA and in common use, (2) to evaluate the human safety of the "new generation" pest control agents, such as insect viruses, pathogenic bacteria, chemosterilants, attractants, hormones, etc., (3) to develop and validate new toxicological methods which can be used for registering and reregistering pesticides, (4) to develop and apply analytical methods for detecting these agents in environmental samples and human tissue, (5) to provide technical assistance to the Office of Pesticide Programs (OPP) in scientific review of toxicologic information, (6) to provide health effects data on compounds under review in the Substitute Chemical Program, and (7) to provide research and information to OPP on specific compounds for the Rebuttable Presumption against Registration (RPAR) Process.

Output will be delivered in a form useful to: (1) assisting in the reregistration and RPAR process, (2) formulating policies on registering new classes of pest control agents, (3) improving the protocols and guidelines required in registering pesticides, (4) operating the Human Monitoring Program, and (5) providing health and chemistry information for public hearings and to regional offices.

Laboratory Assignment: Health Effects Research Laboratory, Research Triangle Park

Multi-Route Exposures and Their Effects: Determination of the Health Implications of Substances Used as Pesticides (Substitute Chemicals) — 615F

Extramural Funds: $959,000

Accomplishment Plan Summary: The Agriculture-Environment and Consumer Protection Appropriation Act of 1974 (PL 93–135) gave the Agency a mandate to conduct a thorough review of the scientific and economic implications of using alternate (substitute) chemicals that replaced cancelled compounds or compounds in litigation to be cancelled including new and old registered pesticides. The review process as established under this mandate provides for the development or scientific criteria for establsihing the hazard associated with the use of each compound and finding suitable substitutes for those compounds found to be hazardous to human health. Much of the data necessary to evaluate pesticide hazard are available in scientific literature; however, for many compounds, new or old, data relating to carcinogenicity, neurotoxicity, teratogenicity and other long-term reproductive effects, mutagenicity, effects on immune responses, endocrine effects, toxicity following inhalation exposure, and field worker reentry exposure hazards are generally lacking. Deficiencies in this data base are met through toxicity studies conducted on selected alternate chemicals. An intergral part of these toxicity studies is the development of improved analytical chemical methods for measurement of substitute pesticides, their biotransformation products, and impurities in experimental animals, in the environment, and in man.

Laboratory Assignment: Health Effects Research Laboratory, Research Triangle Park

Assessment of the Health Effects of Exposure to Radiant Energy — 628A

Extramural Funds: $72,000

Accomplishment Plan Summary: The EPA has the responsibility to establsih guidelines for environmental levels of non-ionizing radiation to which the public is exposed. Data from ongoing EPA research is beginning to confirm existing international data of harmful effects of chronic, low level exposures. If substantiated, these findings would suggest the current United States occupational guide to be too high for use as a departure point for providing environmental guidance to protect public health. Effects are to be studied for acute and chronic exposures to electromagnetic radiation using animal models. Power densities used should emphasize levels at or below those equivalent to ten milliwatts per square centimeter in man. Continuous and pulsed radio frequency and microwave frequencies as well as very low frequencies (e.g., high power transmission lines) are to be utilized. Under these conditions research is to be directed toward the identification of (1) the potential biological effects of exposure to microwave and radio frequencies characteristic of those to which human populations are exposed, and

(2) the mechanisms of interaction of electromagnetic radiation with biological systems and the frequency dependence and power densities of the interactions.

Laboratory Assignment: Health Effects Research Laboratory, Research Triangle Park

Multi-Route Exposures and Their Effects: Identification of Adverse Health Effects Due to Exposure to Toxic Substances — 629A

Extramural Funds: $380,000

Accomplishment Plan Summary: The objectives of the toxic substances health effects research are: (1) to delineate the potential hazards to human health of environmental pollutants; (2) to develop methods by which various classes of toxic substances can be rapidly screened for specific biological activity potentially hazardous to human health; (3) to provide rapid, sensitive, and unambiguous biochemical parameters by which a quantitative assessment of exposure level can be made on human populations; (4) to develop methods by utilizing fundamental physical constants and molecular structure by which persistence and disposition of toxic substances as well as biological activity can be predicted by utilizing and (5) to provide estimate of hazard to man by extrapolation of animal model studies. The passage of the Toxic Substances Control Act makes it imperative that these objectives be initiated. This program will have a major responsibility in providing health effects data to the Office of Toxic Substances and is essential to provide information relative to man's exposure to environmental hazardous substances from multiple areas of the environment. The National Academy of Sciences has stressed the significance of evaluating the cumulative health impact of total body burden rather than the burden acquired from one or another part of the environment or only a single toxic material. Sound scientific information will be increasingly needed to provide a basis for taking regulatory actions before human or environmental exposure; therefore, rearch outputs from this program are essential for the Office of Toxic Substances to meet their legally-mandated regulatory responsibility.

Laboratory Assignment: Health Effects Research Laboratory, Research Triangle Park

Criteria Development and Special Studies — 630C

Extramural Funds: $730,000

Accomplishment Plan Summary: In order to set and determine whether to set pollution control regulations, EPA requires detailed assessments of available scientific and technical information on specific pollutants. the best possible standards. EPA is also facing increasing demands for economic analysis of its regulatory programs and actions, particularly for cost-benefit analysis by Congress, industry, the academic community, and the Office of Management and Budget. This program provides the direction for that portion of the criteria development program carried out by Headquarters and for all of the economic analysis.

Laboratory Assignment: Office of Health and Ecological Effects, Headquarters

HEALTH AND ECOLOGICAL EFFECTS PROGRAM AREA
ECOLOGICAL PROCESSES AND EFFECTS SUBPROGRAM

Ecological processes and effects research is directed toward determining the effects of air, water and terrestrial pollutants on the structure and function of the ecosystems and on biotic and abiotic subcomponents of these ecosystems. The research effort is planned and organized along specific problem area lines; work is directed toward target media and conducted according to the character of the problem. Media are divided into freshwater, marine and terrestrial components.

"Systems Characterization and Impact Assessment," a sub-division within each medium, broadly covers projects which include field studies, theoretical or mathematical simulations, and the characterization of field and laboratory model ecosystems for potential use in criteria development. In contrast, Ecological Criteria Development deals mostly with carefully controlled laboratory greenhouse or field studies, the primary objective of which is the establishment of legally defensible criteria.

Freshwater Ecological Processes and Effects — 608A

Extramural Funds: $2,088,000

Accomplishment Plan Summary: The research program on the ecological effects of pollutants in freshwater ecosystems is primarily designed to aid the Agency in the development of water quality criteria, as required under Section 304(a) of the Federal Water Pollution Control Act (PL 92–500), and to provide information for use in developing legally defensible effluent standards, as required under Sections 307(a) and 316 ofthe PL 92–500. To meet these objectives, research is being conducted in the following major areas: (1) Identification and evaluation of the effects of non-pesticide organic and inorganic pollutants on the physiology, biochemistry, pathology and behavior of freshwater organisms; (2) Development of screening and short-term tests and their application to the analysis of the effects of complex municipal and industrial effluents on freshwater organisms; (3) Determination and simulation of freshwater population, community and ecosystem responses to pollutant stress; and (4) Determination of physical, chemical, and biological transformation and bioaccumulation of pollutants by freshwater organisms and ecosystems. The freshwater effects program also includes research to fulfill Agency requirements under Sections 208 and 314 of PL 92–500. This research includes the determination of the ecological effects of non-point source (NPS) pollution and evaluation of the effectiveness of NPS management techniques; and assessment of lake restoration techniques. Research is being conducted on the characterization of pollution problems and the development of predictive methods for describing fate and effects of pollutants in the Great Lakes. Information derived from this research effort is integrated with other Great Lakes research through the International Joint Commission. Research will be conducted as required under Section 10 of the recently enacted Toxic Substances Control Act (PL 94–469) The anticipated emphasis will be in the development of screening methods for toxic substances.

Laboratory Assignment: Environmental Research Laboratory, Corvallis
Environmental Research Laboratory, Duluth

HEALTH AND ECOLOGICAL EFFECTS PROGRAM AREA
ECOLOGICAL PROCESSES AND EFFECTS SUBPROGRAM

Marine and Estuarine Ecological Processes and Effects -- 608C

Extramural Funds: $620,000

Accomplishment Plan Summary: A major objective of the ecological effects research program in marine and estuarine ecosystems is to provide information needed by the Agency in responding to Sections 304(a), 307 and 311 of the Federal Water Pollution Control Act (PL 92-500). These sections require the Administrator to establish water quality criteria and develop legally defensible effluent standards for environmental pollutants. To provide an adequate information base for these determinations, research is being conducted in the following areas: (1) Development of methods to yield improved and more rapid measurements of organism and ecosystem-level effects of pollution stress; (2) Development and improvement of methods for culturing, holding and rearing experimental organisms and expansion of the set of response parameters used to assess effects of ecological stress; (3) Determination of the effects of complex wastes on estuarine and marine organisms and ecosystems; (4) Determination of the fate and ecological effects of oil and derived hydrocarbons in estuarine and marine ecosystems, including arctic and subarctic ecosystems; (5) Determination of the effects of chlorine-substitute disinfection processes on estuarine ecosystems; and (6) Assessment of the carcinogenicity of pollutants in the marine environment.

To meet Agency requirements under the Marine Protection, Research and Sanctuaries Act of 1972 (PL 92-532) and Sections 403 and 404 of PL 92-500 ecological research is being conducted on the effects of the dumping and discharge of pollutants into the ocean. Research is being conducted in the following major areas: (1) Determination of the availability of trace metals in marine ecosystems; (2) Development and evaluation of disposal site assessment methodologies; (3) Assessment of the recovery of marine ecosystems upon the relaxation of stress; (4) Determination of the fate of ocean disposed wastes; (5) Determination of the ecological effects of disposed dredge materials; (6) Determination of the effects of disposal methodologies developed as alternatives to ocean disposal; and (7) Delineation of mixing zones in the marine environment.

Research is also being conducted on ecosystem characteristics and processes to improve the capability of the Agency in predicting ecological impacts and making management and regulatory decisions. In response to needs of Section 404 of PL 92-500 research is being conducted to define wetland boundaries. To provide information necessary for assessing pollutant impacts in marine and estuarine environments, research is being conducted on physical factors influencing pollutant transport and retention; and on the response of estuarine ecosystems to a decrease in pollution stress.

Laboratory Assignment: Environmental Research Laboratory, Narragansett
Environmental Research Laboratory, Corvallis
Environmental Research Laboratory, Gulf Breeze

Criteria Development and Special Studies — 616A

Extramural Funds: $125,000

Accomplishment Plan Summary: This program is designed to develop criteria documents and establish appropriate review processes on specific pollutants in the environment. These documents represent the best up-to-date compilation of scientific knowledge; they contain a thorough review of scientific literature and an assessment of multimedia health and environmental effects of pollutants in order to provide continuing data base needs for

EPA in setting standards. Additionally, they fulfill specific requirements of the Office of Water Planning and Standards (OWPS), and serve other offices of the Agency.

Laboratory Assignment: Health Effects Research Laboratory, Cincinnati

Ecological Effects of Substitute Pesticide Chemicals — 714B

Extramural Funds: $365,000

Accomplishment Plan Summary: To develop and validate for use suitable laboratory and/or field methods and techniques for assessing deleterious and/or beneficial ecological effects of designated candidate substitute pesticide chemicals when they may be used or transported to any or all of the following ecosystems: terrestrial, estuarine/marine, freshwater. Transport of either the substitute pesticide or its degradation components within the environment, its bio-accumulation, synergism with other pesticides or pollutants, and other pertinent ecological properties will be appropriately evaluated within the context of its likely designated use. The pesticide chemicals for this program will be those designated by the Office of Pesticide Programs.

Laboratory Assignment: Environmental Research Laboratory, Gulf Breeze
Environmental Research Laboratory, Duluth
Environmental Research Laboratory, Corvallis

HEALTH AND ECOLOGICAL EFFECTS PROGRAM AREA
TRANSPORT AND FATE OF POLLUTANTS SUBPROGRAM

The transport and fate research subprogram is directed toward the development of empirical and analytical techniques that relate air pollution source emissions to ambient exposures. This requires research in the area of (a) atmospheric processes and effects for the determination of air pollutant sources, sinks, transport and transformation of airborne gaseous and particulate matter and the effects of air pollutants on visibility, rainfall, and climate and (b) air pollutant characterization and measurement in support of the development of new and/or improved technology to permit the characterization and quantification of pollutants from stationary or mobile emission sources either at the source or in the ambient air. A corresponding research effort exists for the transport and fate of pollutants entering the aquatic and terrestrial ecosystems.

Atmospheric Processes and Effects — 603A

Extramural Funds: $7,662,000

Accomplishment Plan Summary: Studies on the atmospheric processes and effects will be conducted to qualitatively and quantitatively determine the sources and sinks, kinetics of formation and removal, and chemical/physical interactions of airborne gaseous and particulate matter. This area of research covers: (1) The development, evaluation, and validation of air quality simulation models for predicting and describing air quality impacts anticipated from various control abatement strategies; (2) Determination of atmospheric chemical and physical processes for describing the formation and decay of gaseous and particulate air pollutants; and (3) Quantification of the atmospheric effects of weather, visibility, climate, and materials due to air pollutant and thermal emissions.

Laboratory Assignment: Environmental Sciences Research Laboratory, Research Triangle Park

Sources, Processes, and Systems — 609A

Extramural Funds: $1,011,000

Accomplishment Plan Summary: The overall objective of this Accomplishment Plan is to provide the scientific understanding, methodologies, and associated data bases required to: (1) evaluate and predict the transport, transformations and fate of trace organics and inorganic pollutants entering freshwater ecosystems; (2) predict water quality impacts resulting from the discharge of point and non-point source pollution into fresh surface waters; and (3) evaluate the relative cost-effectiveness of alternative basin-wide point and non-point source pollution control strategies. This technology will be used in the development of water quality criteria for toxic pollutants of test protocols and decision rationale for assessing the environmental exposure of toxic substances and evaluating pesticides under consideration for registration, and in the identification of the necessary point and non-point source control requirements under the Federal Water Pollution Control Act (PL 92–500) section 208 and similar water quality management planning efforts, and determination of appropriate effluent limitations to be imposed through the permit program in water quality limited stream segments.

Laboratory Assignment: Environmental Research Laboratory, Athens

ENERGY/ENVIRONMENT PROGRAM AREA

The Energy/Environment Program Area is fundamental to EPA's responsibility to protect the public health and welfare from the adverse effects of pollutants discharged by or associated with energy systems. Such protection must be accomplished through a multimedia approach so that the control of one form of pollution does not result in an unacceptable impact occurring in another medium. Because of the potentially acute health and ecological effects associated with the traditional, as well as the new technologies for fuel extraction, processing, and conversion, the EPA has a major responsibility in this area to ensure that environmental quality and human health are protected. Further, since many of the problems are long-term, e.g., many technologies will not be available and in commercial use before early 1985, the EPA must have programs underway now to develop the health and technical data base necessary to support future New Source Performance Standards and Ambient Air Quality Standards. The Energy/Environment Program Area is organized into four subprograms: Extraction and Processing Technology; Conservation, Utilization and Technology Assessment; Health and Ecological Effects; and technical support.

EXTRACTION AND PROCESSING TECHNOLOGY SUBPROGRAM

The Extraction and Processing Technology Subprogram includes the assessment of problems and development of control techniques to mitigate the environmental impact of the extraction of energy resources. Solid, liquid and gaseous fuels as well as advanced energy sources, such as uranium and geothermal energy, are considered. The objectives of the extraction program cover a wide spectrum of activities including the development of techniques to abate acid mine drainage, to the restoration of strip-mined land, the assessment of the socio-economic impacts of mining a virgin area and the assessment of practices on off-shore oil rigs. Also included is a program which provides environmental control technology applicable to, and environmental assessments of, important fuel processing schemes, including low- and high-BTU gasification, liquification, coal cleaning, shale oil processing, and fluidized bed combustion.

Energy Control Technology—Fuel Processing — 623A

Extramural Funds: $12,950,000

Accomplishment Plan Summary: The fuel processing program will promote and participate in the development of advanced technologies for fuel processing by providing environmental technology development and environmental assessment. Processes for physical/chemical coal cleaning are being developed with the support of the Bureau of Mines and the fluidized bed program is being aided by Energy Research and Development Agency - ARGONNE (ERDA-ARGONNE). Environmental support is being given to the National fluidized bed combustion program. In the area of synthetic fuels; the program is identifying and quantifying the discharges from processes under development and evaluating and developing control technology. This program is being conducted in close cooperation with ERDA. The chemically active fluidized bed process for residual oil cleaning is being demonstrated at a utility. Physical coal cleaning to meet sulfur standards is being demonstrated at an electrical utility.

Laboratory Assignment: Industrial Environmental Research Laboratory, Research Triangle Park

Energy Control Technology—Fuel Processing — 623A

Extramural Funds: $1,552,300

Accomplishment Plan Summary: The fuel processing program will determine the environmental aspects associated with the development of advanced technologies for the production of synthetic fuels from non-coal sources including oil shale. The program will identify and quantify the discharges from processes under development and evaluate existing control technology. As a result of this FY-78 initiative, improved pollution control technology will begin to be developed. Characterization of the multi-media pollution problems associated with syntheitc fuel production and utilization will be accomplished. This program is being coordinated closely with the oil shale extraction and handling program and with the synthetic fuels (from coal) program.

Laboratory Assignment: Industrial Environmental Research Laboratory, Cincinnati

Energy Resource Extraction and Handling—Solid Fuels — 623B

Extramural Funds: $2,627,000

Accomplishment Plan Summary: As mandated under the Air, Water, and Solid Waste Acts, this program is designed to develop and demonstrate new control technology for the non-point source pollution problems and treatment of point source discharges associated with the extraction and handling of solid fuels. Work is progressing to: (1) Assess the potential environmental damages (air, water, noise, etc., from active and abandoned mining, transportation and benefication processes; (2) Develop methods to control, treat and abate environmental pollutants from these operations; (3) Demonstrate and document the technical/operational feasibility and cost/effectiveness of environmental control options; (4) Provide, on a timely basis environmental control criteria; and (5) Prepare standardized user manuals which encompass all environmental pollution control aspects in a form that meets the operational needs of regulatory and control agencies and the mining industry. Major emphasis will be placed on active mining, especially on newly emerging extractive efforts, while continuing minimum efforts on abandoned mines to keep abreast of the latest reclamation and restoration techniques.

Laboratory Assignment: Industrial Environmental Research Laboratory, Cincinnati

Energy Resource Extraction and Handling—Oil and Gas Production — 623C

Extramural Funds: $1,667,200

Accomplishment Plan Summary: In accordance with the water and solid waste acts, the objectives of the oil and gas production environmental research program are: (1) Assess the existing and potential adverse environmental impacts (air, water, land) from active and planned oil and gas production, storage and transportation facilities; (2) develop methods, technology and equipment to prevent, control and abate environmental pollutants from these operations; (3) demonstrate and document the technical operational feasibility and cost/effectiveness of environmental control options; (4) provide on a timely basis environmental

control guidelines; (5) provide standardized users manuals which encompass all environmental pollution control aspects in a form that meets the operational needs of both regulatory/control agencies and industry.

Laboratory Assignment: Industrial Environmental Research Laboratory, Cincinnati

Environmental Assessment Interface — 623D

Extramural Funds: $120,000

Accomplishment Plan Summary: The goal of the environmental assessment program is to determine, in the case where a single system or process is being assessed, whether the system/process is environmentally acceptable or whether further or more economical control of waste streams is necessary. If further control is considered necessary, the assessment estimates how much control is needed and what waste stream components are especially important to control. In cases where comparative assessments are being made of two or more systems or processes, an additional goal may be to determine which one(s) are environmentally preferable.

The overall objective of this program is to provide the Office of Energy, Minerals and Industry Environmental Assessment Program necessary consultation, data, and research information in the development, use and interpretation of: (1) decision criteria, (2) impact factors, and (3) bioassays.

Laboratory Assignment: Environmental Research Laboratory, Narragansett
Environmental Research Laboratory, Corvallis
Environmental Research Laboratory, Gulf Breeze

ENERGY/ENVIRONMENT PROGRAM AREA
CONSERVATION, UTILIZATION AND TECHNOLOGY ASSESSMENTS SUBPROGRAM

The Conservation, Utilization and Technology Assessments Subprogram includes three distinct parts — conservation, utilization (electrical energy production) and technology assessments.

The conservation portion of the Subprogram will provide environmental assessments and contribute to the development of environmentally compatible advanced technologies. It also provides control technologies, waste recovery, indoor air quality enhancement and second generation energy systems, e.g., solar and geothermal energy.

The utilization portion of this subprogram includes the identification, characterization, assessment and development, where appropriate, of control technology for pollutants associated with electric utility and industrial combustion sources. A multi-media approach is planned with gaseous, liquid and solid wastes considered. Both primary pollutants (effluents from uncontrolled combustion systems) and secondary residuals (effluents from control technology) must be carefully considered. Emphasis is focused on generating information which can be used to help set environmental standards and guidelines and develop economical control technology so that such standards can be achieved.

The objective of the integrated assessment portion of this subprogram is the identification of environmentally, socially and economically acceptable alternatives for meeting National energy supply objectives, and assistance in the selection of optimum policies for the attainment of associated environmental quality goals.

Utility and Industrial Power – 624A

Extramural Funds: $18,220,000

Accomplishment Plan Summary: The overall objective of this activity is the identification, characterization, assessment and development, where appropriate, of control technology for pollutants associated with electric utility and industrial stationary combustion sources. It is important that a multi-media approach be taken with gaseous, liquid, and solid wastes carefully investigated in terms of a balanced and comprehensive control plan. Both primary pollutants (effluents from uncontrolled combustion systems) and secondary residuals (effluents from controlled technology) will be carefully considered. Emphasis will be focused on (1) generating information which will be useful in the preparation of environmental standards and guidelines, and (2) developing economical control technology so that such standards can be achieved.

Laboratory Assignment: Industrial Environmental Research Laboratory, Research Triangle Park

Flue Gas Cleaning Waste Disposal — 624A

Extramural Funds: $100,000

Accomplishment Plan Summary: Conduct specific projects as part of the EPA program to control waste and water pollution from utility and industrial flue gas cleaning systems. The objectives of this activity are as follows: (1) Determine the extent to which the migration of chemicals from flue gas cleaning wastes can be attenuated by soils in land disposal sites and develop an empirical method to describe the migration potential;
(2) Determine the compatibility of various liner materials when exposed to flue gas cleaning wastes; (3) Determine the leachability and durability of products from first generation flue gas cleaning waste treatment processes, conduct a field evaluation of current flue gas cleaning waste disposal technology, and assess, screen, and

demonstrate (on a pilot scale) second generation flue gas cleaning waste treatment processes; and (4) Establish the data base for the future development of standards for the disposal of flue gas cleaning wastes and identify research and development needs for standards development.

Laboratory Assignment: Municipal Environmental Research Laboratory, Cincinnati

Wastes-As-Fuel — 624B

Extramural Funds: $925,000

Accomplishment Plan Summary: Activities in this program include technical, environmental, and economic evaluations of waste disposal including wastes co-incineration; fuel and feedstock preparation; biological conversion energy recovery technologies, including advanced processes; surveys of the organic and mixed waste streams except industrial; development of pollutant assessment criteria, sampling and analysis techniques and the performance of pollutant characterizations for processes; pollution controls development; and technical assistance.

Assess, develop and evaluate equipment and systems for preparing fuels and feedstocks for energy recovery via all conversion processes (in conjunction with materials recovery) and for converting wastes to fuels via biological conversion processes. Analyses will determine the optimal composition of waste inputs, energy balances, material balances, emissions and residuals, effectiveness of emission controls and residues handling systems, needs for new types of pollutant control equipment, life-cycle costs, economic viability, theory, and other aspects.

Laboratory Assignment: Municipal Environmental Research Laboratory, Cincinnati

Environmental Aspects of Energy Conservation Methods and Advanced Energy Systems — 624B

Extramural Funds: $4,046,900

Accomplishment Plan Summary: The objective of this program is to develop information on the probable environmental impacts of waste-as-fuel technologies, energy conservation activities, and advanced energy systems. In addition, the purpose is to assure the development of environmentally compatible advanced technologies and pollution control technologies for waste-as-fuel processes, for indoor air quality, energy conservation, advanced energy conversion cycles, and advanced energy systems (solar and geothermal energy). Techniques and technolgoies are under development by the Energy Research and Development Administration, Federal Energy Administration, Housing and Urban Development, and other agencies in these latter areas, and by the EPA in the waste-as-fuel area. Outputs will support EPA's regulatory responsibilities, by assuring the environmental compatibility of techniques and technologies in each energy area. Outputs will also support EPA's role on two interagency working groups—the Interagency Task Force on Energy Conservation in Buildings and the Interagency Task Force on Energy Conservation in Industry.

Laboratory Assignment: Industrial Environmental Research Laboratory, Cincinnati

Geothermal Environmental Impact Assessment — 624B

Extramural Funds: $110,000

Accomplishment Plan Summary: The objective of this effort is to assess the actual and potential environmental impacts of existing and potential geothermal energy resource exploitation. Program emphasis is on groundwater contamination. Coordination with the Energy Research and Development Administration is essential. Studies should identify pollutants, pathways into the underground water environment, ecological hazards associated with long term operating facilities and design a monitoring system applicable to any geothermal resource development and conversion facility. Initial focus should be on Geysers, Imperial Valley and Klamath Rio Grande Rift Zone and Roosevelt Hot Springs. Topics studied should include: produced fluids, disposal methods, subsidence possibilities, seismic effects, thermal losses, groundwater pollution, fluids radioactivity, non-condensates requiring monitoring and food chain uptake of geothermally associated pollutants. Projects should be coordinated closely with the Industrial Environmental Research Laboratory, Cincinnati, and data produced should support the development of effluent guidelines and other environmental regulations for geothermal systems.

Laboratory Assignment: Environmental Monitoring and Support Laboratory, Las Vegas

Energy-Integrated Assessment — 624C

Extramural Funds: $2,356,000

Accomplishment Plan Summary: The overall objective of this Accomplishment Plan is the identification of environmentally, socially, and economically acceptable alternatives for meeting National energy supply objectives and to assist in the selection of "optimum" policies for the attainment of associated environmental quality goals. This objective will be met by: (1) Integrating the results of the environmental research program with the remainder of the Energy Research Program; (2) Evaluating the cost/risk/benefit trade-offs of energy production and pollution control alternatives; (3) Conducting technology assessments which evaluate alternative energy technologies and approaches for implementing energy development, preventing environmental damage, and securing related benefits; and (4) Identifying gaps in present research programs and indicating new priority research topics which must be addressed in order to support direct Agency responsibilities.

Laboratory Assignment: Office of Energy, Minerals and Industry, Headquarters
Industrial Environmental Research Laboratory, Cincinnati
Industrial Environmental Research Laboratory, Research Triangle Park

ENERGY/ENVIRONMENT PROGRAM AREA
HEALTH AND ECOLOGICAL EFFECTS SUBPROGRAM

The Health and Ecological Effects Subprogram encompasses a program to determine the environmental effects associated with energy extraction, transmission, conversion and use so that measures can be taken in a timely manner to protect human health and the ecosystem. Identification of the pollutants released by energy-related industrial operations and determination of their impact on the human and natural environment will define the mission control requirements for the polluting operations. Included are studies to characterize the risks, costs and benefits to human health and welfare and environmental quality of development and utilization of energy technology.

Effects of Energy Related Pollutants on Organisms and Ecosystems — 625A

Extramural Funds: $3,815,000

Accomplishment Plan Summary: Increased reliance on domestic energy sources is resulting in increased exploration and production of offshore oil, and gas increased mining and combustion of coal; and the potential for development of geothermal and oil shale industries. Nearly every phase of these fuel cycles may result in local or regional environmental degradation. This activity is designed to provide the ecological information required in making management and policy decisions concerning coal, oil, oil shale, geothermal development and facility siting decisions. Specific areas of research include: (1) Determine the acute and chronic toxicological effects on freshwater, and terrestrial organisms and resultant ecosystem impacts from single pollutants and combination of pollutants released from energy extraction, conversion, transmission and use. (2) Study the dynamics of energy-related pollutants in marine systems; thermal effects of energy utilization in combination with other pollutant stress, and the impacts of pollutants from petroleum extraction, refineries and fossil fuel utilization. (3)Study the ecological effects of halogen and biocide usage in power plant pass-through cooling water treatment, and of offshore petroleum development in the Gulf of Mexico, dealing specifically with drilling muds. Studies directed toward predicting the potential for accumulation and depuration of carginogens in seafood organisms are underway and continuing analytical methods, carcinogen assay methods and cultivation of marine animals are underway. (4) Development of a mathematical model for the prediction of plume behavior from mechanical draft cooling levers, with major emphasis on the effects of wind and atmospheric stability conditions on the plume, is ongoing. (5)Assessment of potential ecological changes in cold climate salt-marshes resulting from crude oil contaminations. (6) Evaluation of current standards for petroleum discharges relative to impacts on effects on planktonic, benthic and intertidal organisms on the West Coast is another phase of study in the next five-year plan.

Laboratory Assignment: Environmental Research Laboratory, Gulf Breeze
Environmental Research Laboratory, Corvallis
Environmental Research Laboratory, Duluth
Environmental Research Laboratory, Narragansett

Transport and Fate of Energy-Related Pollutants in Ecosystems — 625B

Extramural Funds: $2,999,000

Accomplishment Plan Summary: Increased reliance on domestic energy sources is resulting in increased extraction and combustion of coal, the development of advanced combustion technologies, and the potential for development of geothermal, oil shale, and synthetic fuel industries. Nearly every phase of these fuel cycles may result in the release of pollutants to the environment. As pollutants move through the environment, their physical, chemical and biological interactions often result in their transformation to new compounds which may be either a

greater or lesser environmental threat than the parent compound. The purpose of this activitiy is to determine the origins, loads, transport pathways, transfer rates, and fates for single pollutants and combinations of pollutants released to the aquatic environment primarily from the coal, oil shale, and geothermal fuel cycles. Knowledge of the environmental transport and transformation of pollutants is essential to relating ecological effects to their cause, and for establishing monitoring and surveillance programs. This information is also basic to setting standards for point source control, and for development of treatment methods and evaluation of their effectiveness.

Laboratory Assignment: Environmental Sciences Research Laboratory, Research Triangle Park
Robert S. Kerr Environmental Research Laboratory, Ada
Environmental Research Laboratory, Athens

Energy Related Pollutant and Effects Monitoring and Associated Methods and Techniques Development — 625C

Extramural Funds: $1,706,000

Accomplishment Plan Summary: This effort is aimed at developing the broad scale monitoring techniques and specific monitoring methods for determining the significant levels and cause/effect relationships between energy-related pollution and media quality on a regional basis. The overall objective of this effort is to provide validated environmental quality baseline data in those geographical areas where the impact of new energy development is or is projected to be of major magnitude on the environment. The output is to be a geographically broad environmental overview which focuses on both the regional and local impact of major energy developments. The purpose of this program is to provide an accurate scientifically valid reference point from which future environmental degradation may be measured and upon which rational policy decisions may be made. These decisions will concern both future environmental standards and the direction and magnitude of specific energy development. This objective includes the development of new and advanced monitoring methods and techniques needed to provide data and information of broad scope in support of the main purpose of the energy program.

While initial efforts are aimed at scoping the extent of regional air and water pollution due to energy developments, outyear efforts will focus on the higher priority scientific problems such as the levels, dispersion and eventual distribution of specific energy related pollutants from geographically specific sources and groups of sources. These outyear efforts will benefit from the development of more sophisticated research monitoring techniques in defining more accurately the precise nature of regional pollution.

Laboratory Assignment: Environmental Monitoring and Support Laboratory, Cincinnati
Environmental Monitoring and Support Laboratory, Las Vegas
Environmental Monitoring and Support Laboratory, Research Triangle Park

Energy Related Pollutant Measurement and Instrumentation Development — 625D

Extramural Funds: $705,000

Accomplishment Plan Summary: The purpose of this effort is to provide adequate, comprehensive measurement methods and analytical techniques for known and anticipated pollutants injected into the environment from expanding and emerging energy technologies. The objective of this program is the development of methods and instrumentation for the measurement of energy-related pollutants and the performance of special field studies and analyses related to characterizing the levels of certain pollutants injected into the environment by new technologies and energy developments at specific geographical sites. Initially emphasis is on elemental and inorganic pollutants from existing, expanding energy technologies for which adequate measurement methods do not exist as well as ambient pollutant levels. Later emphasis will be on sampling, measurement and analysis of organic and metallorganic compounds which give indication of being hazardous, with special attention to the emerging fossil fuel technologies. Eventual products are comprehensive pollutant measurement methodologies for air, water and solid waste pollutants on a technology by technology basis.

Laboratory Assignment: Environmental Sciences Research Laboratory, Research Triangle Park
Environmental Research Laboratory, Athens

Health Effects Research—Energy-Related Air, Water and Multi-Route Exposures — 625F

Extramural Funds: $2,860,000

Accomplishment Plan Summary: Attainment of the natural goal of energy independence in the time frame desired will result in a modification in the magnitude and spectrum of chemical and physical agents which are introduced into the biosphere by the various energy industries. Although some of the agents are known to be deleterious to human health, the quantitative aspects of the toxicity of many of the agents have yet to be determined either on an individual basis or in conjunction with other environmental agents, not all of which arise solely from the energy industries.

The primary objectives of this program of research in the area of energy-related health effects are: (1) to determine the qualitative and quantitative effects of energy-related agents on human health; (2) to assess risks (health) to human populations associated with all aspects of energy production and utilization for the various energy technologies; (3) to provide guidance for energy systems related control and abatement programs to the extent that such programs are dependent upon health effects data, and (4) to provide that data base necessary for the establishment of standards of exposure to energy-related hazardous agents on a schedule consistent with the attainment of the national goal of self-sufficiency.

ENERGY/ENVIRONMENT PROGRAM AREA
HEALTH AND ECOLOGICAL EFFECTS SUBPROGRAM

The ultimate objective is to understand how the physical and chemical character of the total exposure of various population groups (occupational, general, susceptible, etc.) is modified by the increase in energy production and utilization and to improve the estimates (reduce uncertainty) of the adverse impacts upon human health that may ensue as a consequence of implementing a particular energy policy. Of major concern are those adverse effects which may result from long term low level exposures or that can manifest themselves only after a long period of time. The emphasis to date has been on the identification of hazardous agents, development of more rapid and sensitive biological screening methods and the evaluation of hazards to man through epidemiological and clinical studies and animal toxicology studies. Studies of mechanisms of metabolism and fate of energy related agents and mechanisms of damage and repair, both of which are required in order to more accurately estimate risk to man by extrapolation of data from animal experiments, will receive greater emphasis in the following years.

Laboratory Assignment: Health Effects Research Laboratory, Cincinnati
Health Effects Research Laboratory, Research Triangle Park

Environmental Assessment Interface — 625G

Extramural Funds: $90,000

Accomplishment Plan Summary: The goal of this program is to determine, in the case where a single system or process is being assessed, whether the system/ process is environmentally acceptable or whether further or more economical control of waste streams is necessary. If further control is considered necessary, the assessment estimates how much control is needed and what waste stream components are especially important to control. In cases where comparative assessments are being made of two or more systems or processes, an additional goal may be to determine which one(s) are environmentally preferable.

The overall objective of the program is to provide the Office of Energy, Minerals and Industry's Environmental Assessment Program necessary consultation, data, and research information in the development, use, and interpretation of: (1) decision criteria; (2) impact factors; and (3) bio-assays.

Laboratory Assignment: Environmental Research Laboratory, Gulf Breeze
Health Effects Research Laboratory, Cincinnati
Health Effects Research Laboratory, Research Triangle Park

ENERGY/ENVIRONMENT PROGRAM AREA
ENERGY TECHNICAL SUPPORT SUBPROGRAM

Technical Support is the assistance in all fields of environmental science that the Office of Research and Development (ORD) provides to other components of the Agency and in many cases to elements outside of EPA. ORD provides assistance for the immediate technical needs of the Agency whenever possible by drawing on the expertise of its research personnel.

Technical Support—Energy — 626A

Extramural Funds: $1,959,000

Accomplishment Plan Summary: There are three objectives of the Energy Technical Support program. First, it provides both the ORD industrial research program and the entire 17-agency Interagency Energy/Environment research and development program with the type of management information systems and support necessary for effective operation. Second, it produces quick-response studies under extreme time constraints as input into major program plan and policy activities. Third, it provides an extensive information transfer function to assure that the technical information and expertise generated by both the industrial and energy programs are available in usable form to industrial and energy decision makers and to the interested public.

Major decisions affecting the future course of the nation's energy development and industrial pollution control efforts are now, and will continue to be, made by a wide variety of private, local, state and Federal organizations. The technical support activity helps to assure that the technical expertise and information the Office of Energy, Minerals and Industry (OEMI) generates is relevant to these decision makers and is available to them in a form which they can use. In addition, the activities sponsored by this program help to bring information on the status of energy and industrial programs and policies to environmental researchers and research planners both within OEMI and in outside organizations. Many of these major energy and industrial decisions will be technology-based. Hence, a viable understanding of the various technologies, as they are developing, is necessary for both the OEMI program manager and the outside decision maker.

Laboratory Assignment: Office of Energy, Minerals and Industry, Headquarters

INDUSTRIAL PROCESSES PROGRAM AREA

A research program in the Industrial Processes Area is essential for the Agency to meet the requirements of the Clean Air Act, Water Pollution Control Act and the Resource Conservation and Recovery Act. Through research in this area, systems are developed and made available to assist industries in achieving compliance with these legislative requirements. Information is developed to assist in the detection, control and abatement of pollution from industrial and extractive processes, and land use. Another part of the program is concerned with identification and economic evaluation of alternate pollution control systems. This research program is comprised of two subprograms—Minerals Processing and Manufacturing; and Renewable Resources.

MINERALS PROCESSING AND MANUFACTURING INDUSTRIES SUBPROGRAM

The Minerals Processing and Manufacturing Industries Subprogram address point sources of pollution arising from the industrial sector of the economy and is focused on those mining, manufacturing, service and trade industries which are involved in the extraction, production and processing of materials into consumer products. In addition, methods to rectify environmental insults resulting from the accidental spill of selected materials are also included. It is the objective of this research activity to support the technology requirements of the Clean Air and Water Pollution Control Acts through the development and demonstration of new or improved technology having industry-wide applicability, short-term achievability and long-term viability.

Hazardous Material Incidents: (Air) 604A — (Water) 610A

Extramural Funds: $1,191,700

Accomplishment Plan Summary: Hazardous material spills such as pesticides, heavy metals and chlorine are a recurring problem. Spills can severely impact public water supplies and other water uses through contamination of surface and groundwaters. Further, spilled volatile and reactive materials can cause significant public health and safety hazards. The objectives of this program are to develop, evaluate and demonstrate new or improved equipment, devices and systems for the prevention, detection, identification, containment, control, removal, cleanup, recovery and disposal of spills or acute releases of hazardous polluting substances. The development of this hardware is to be carried out beyond the prototype stage to the point where it is ready for field implementation by the commercial community. Techniques are to be defined for the redevelopment and restoration of ecosystems that have been biologically damaged as a result of spills. To assess these damages, the ecological effects and persistency of high concentration, short duration slugs (non-continuous discharges) of hazardous substances on the environment are to be determined.

Laboratory Assignment: Industrial Environmental Research Laboratory, Cincinnati

Materials Processing: (Air) 604B — (Water) 610B

Extramural Funds: $4,425,000

Accomplishment Plan Summary: The problem area is discrete point sources of air, water and residue pollution arising from manufacturing and service industries primarily devoted to the processing of chemicals and other raw materials into intermediate and final products (e.g., petrochemicals, agrichemicals, to include pesticides and fertlizers, electroplating and fabricated metal products, textiles, inorganics chemicals, pulp and paper and food products). Of special concern are toxic chemicals and hazardous pollutant control.

INDUSTRIAL PROCESSES PROGRAM AREA
MINERALS PROCESSING AND MANUFACTURING INDUSTRIES SUBPROGRAM

The objective of the program is to develop technology necessary to eliminate the discharge/emission of all pollutants (primarily toxic pollutants) from materials processing industry point sources through the conduct of a technology research program dedicated to a spectrum of research activities culminating in the demonstration or assessment of engineering scale technologies. Deliverables are research and development findings which will be immediately translated into public/private sector use through reports, seminars, and Agency standards.

All research and development activities must have industry-wide applicability, technical and economic achievability for implementation, long-term viability, and must serve as a basis for establishing, improving or implementing required standards. The research can be classified as Open Cycle, Closed Cycle, Toxics Control Technology and Total Environmental Control. The decision as to which broad technology option has the highest priority for ORD focus is unique to each point source category and must (a) result from an assessment of the state-of-the-art control technology, (b) fit within the framework of the Agency's discharge/emission standards, and (c) include an evaluation of implementation achievability and viability.

Laboratory Assignment: Industrial Environmental Research Laboratory, Cincinnati
Industrial Environmental Research Laboratory, Research Triangle Park
Robert S. Kerr Environmental Research Laboratory, Ada

Materials Production: (Air) 604C — (Water) 610C

Extramural Funds: $3,671,400

Accomplishment Plan Summary: Activities under this program address environmental problems related to the iron and steel, non-ferrous, petroleum refining and general mining (other than fuel sources) industrial segments. These include discrete point sources of air, water and residue pollution resulting from the extraction and processing of raw materials into intermediate products for consumption by the materials processing industries. Of special concern are toxic chemicals and hazardous residuals control. The objective of this program is to develop technology necessary to eliminate the discharge/emission of all pollutants primarily toxic pollutants from materials production industry point sources through the conduct of a technology research program dedicated to a spectrum of research activities culminating in the demonstration or assessment of engineering scale technologies. Deliveriables are research and development findings which will be immediately translated into public/private sector use through reports, seminars, and Agency standards. All research and development activities must have industry-wide applicability, technical and economic achievability for implementation, long-term viability, and must serve as a basis for establishing, improving or implementing required standards. The research can be classified as Open Cycle, Closed Cycle, Toxicant Control Technology and Total Environmental Control Technology. The decision as to which broad technology option has the highest priority for ORD focus is unique to each point source category and must result from an assessment of the anticipated health and environmental impact, as well as state-of-the-art control technology.

Laboratory Assignment: Industrial Environmental Research Laboratory, Cincinnati
Industrial Environmental Research Laboratory, Research Triangle Park
Robert S. Kerr Environmental Research Laboratory, Ada

Areawide-Combined Industrial Point Sources — 610F

Extramural Funds: $110,000

Accomplishment Plan Summary: The area of concern includes all industrial point sources, such as manufacturing, mining, electric and water service establishments, which seek to manage their pollution on an areawide or combined basis with other point sources. The major objective is the development of the means necessary to eliminate the discharge or emission of pollutants for the areawide or combined point source where industrial sources are the predominate contributor. Outputs are to include integrated research, development, and pilot demonstration activities culminating in full scale demonstrations or assessments of engineering scale technologies. The results of the activities will be made available for public and private sector use by means of technical reports, seminars, design guidelines, and Agency discharge regulations and standards. The research shall be classified as Open Cycle, Closed Cycle, and Total Environmental Control depending upon whether an interim discharge of pollutants is characteristic and whether point source control of air and solid waste problems are addressed. The research activities must have industry-wide applicability, technical and economic achievability for implementation, long-term viability, and serve as a basis for establishing, improving, and/or implementing the required discharge standards of the Federal Water Pollution Control Act (PL 92–500). The water standards sought, levels of control desired, and implied leadtime requirements for PL 92–500 are: (1) Best available control technology economically achievable by January 1979; (2) Elimination of the discharge of pollutants by 1984; (3) Elimination of multi-media pollution discharges—by 1984.

Laboratory Assignment: Robert S. Kerr Environmental Research Laboratory, Ada

INDUSTRIAL PROCESSES PROGRAM AREA
RENEWABLE RESOURCES SUBPROGRAM

The Renewable Resources Subprogram encompasses the development and evaluation of total management systems, including Best Management Practices (BMP's) and pollution control predictive methodologies, to control pollution from the production and harvesting of food and fiber, and from their related residual wastes. It also includes the assessment of probable trends in the production of renewable resources to determine their resulting environmental and socio-economic impacts, including crop production on both irrigated and nonirrigated lands, forest management practices and animal production.

The Pesticides Renewable Resources Subprogram encompasses the development and demonstration of integrated pest management strategies based upon sound biological, environmental and economic information. Combinations of nonchemical and chemical controls will be optimized to reduce the usage and runoff of agricultural chemical pesticides.

Irrigated Crop Production — 770A

Extramural Funds: $1,061,000

Accomplishment Plan Summary: The control of environmental degradation caused by irrigated crop production is a multifaceted problem involving technical, legal, economic, and institutional considerations. The objective of this program is to develop and demonstrate the fundamental technology needed for full scale pollution control programs in irrigated areas. This technology includes: canal and lateral lining and other structural controls for water delivery systems; methods to minimize water use; increased water use efficiency; control of nutrient losses; salinity control; sediment control; reduced leaching losses; control of pesticide transport in irrigated systems; and consideration of treatment systems. The evaluation of the legal, economic, and institutional constraints to water management reform and technology changes is required. Development and confirmation of mathematical techniques for simulating and predicting pollutant movement, based on physical chemical-biological processes occurring in irrigated soil systems are required to assess the effects of on-farm water management practices on the water quality of receiving streams. The mathematical models will be useful in developing technically sound alternative pollution control management schemes for irrigated systems. The outputs will be used by Federal, state and local planning and pollution control agencies for the assessment and control of pollutants resulting from irrigated crop production activities.

Laboratory Assignment: Robert S. Kerr Environmental Research Laboratory, Ada

Non-Irrigated Crop Production — 770B

Extramural Funds: $804,000

Accomplishment Plan Summary: Emphasis in the non-irrigated crop production area is to be directed to: (1) providing tools, including appropriate predictive methods and models, for State and local planner/decision makers to determine the probable environmental loadings of the major agricultural pollutants, including pesticides, sediment, and plant nutrients; (2) techniques for identification, evaluation, ranking and selection of candidate best management practices (BMPs) that minimize agricultural pollution; and (3) developing, evaluating and demonstrating implementation strategies for candidate BMPs. These tools are to be compiled in appropriate format, e.g., as guidance material and user manuals for the environmental planner/decision maker, for distribution as soon as possible after they have been prepared. Expertise of the U.S. Department of Agriculture (USDA) and other agencies, where appropriate, is to be used in developing and evaluating the tools and they should be encouraged to use and distribute the tools at the local levels.

Also, we should collaborate with USDA on [illegible] where appropriate, to take advantage of their research on cropping practices and conservation methods so that EPA can better determine the optimal means to achieve environmental quality goals.

Laboratory Assignment: Environmental Research Laboratory, Athens

Forest Management — 770C

Extramural Funds: $315,000

Accomplishment Plan Summary: The focus in [illegible] area is on the assessment, development and evaluation of management methods and planning tools that can be used to mitigate adverse environmental impacts of forest management activities. Assessment methodologies include predictive modeling and decision protocols that relate forest management practices to environmental quality, and non-point source control strategies to total forest and watershed resource management, including, desirably, the socio-economic aspects. Pollution control management methods include cost-effective structural (i.e., engineering technologies) and non-structural (e.g., land use practices) approaches that are demonstrative of the "best management practices" needed to satisfy the 1983 water quality goals. This information is needed by state and local planners/decision makers to carry out the areawide waste management responsibilities under Section 208 of the Federal Water Pollution Control Act (PL 92–500).

This program will continue developing guidelines and assessment tools for evaluating candidate forestry best management practices. In the outyears the program will be oriented toward validating, and in conjunction with the U.S. Forest Service (USFS), demonstrating the application of pollutant loading and watershed scale models. Later emphasis will be on the transfer of technologies to land managers and planning agencies. Because of its dual role as user and producer of research, the USFS will be relied on to conduct relevant research, including evaluation and/or demonstration of candidate best management practices.

Laboratory Assignment: Environmental Research Laboratory, Athens

Animal Production — 770D

Extramural Funds: $600,000

Accomplishment Plan Summary: Animal wastes originating from livestock and poultry production operations continue to be a major environmental problem confronting the Agency. It is necessary to provide the management methods and technology to handle manures in the most environmentally safe manner. Currently the most economically feasible way of managing the wastes from the majority of animal production units is by means of land application, i.e., using the manures as fertilizer for crop production. Application of agronomic rates may not be feasible in areas with limited land availability where there are large concentrations of animals or where restricted by climate or hydrologic conditions.
Therefore, a wide range of application techniques must be evaluated and guidelines suggested for all animal production regions of the Nation. Continued animal production in areas where land application is not feasible

may be dependent upon alternative reuse/recycle/treatment methods. These systems will be evaluated, their residual waste streams characterized, and ultimate disposal schemes proposed. The majority of animals in the Nation are produced under non-feedlot conditions and therefore represent a distinctive nonpoint pollution source. Pollution potentials of these operations must be evaluated and control/management systems must be developed.

Laboratory Assignment: Robert S. Kerr Environmental Research Laboratory, Ada

Environmental Impact Assessment of Renewable Resource Production Trends — 770F

Extramural Funds: $235,000

Accomplishment Plan Summary: The Agency and ORD's overall goal is to determine and assess the environmental implications and impacts of the efforts in this country to increase production of food and fiber created by a growing world population and food crisis and evaluate alternate methods to minimize the environmental impact of these efforts. In the near term increased production will probably be achieved using current farming and forestry practices on existing and additional land areas, much of it marginal and sub-marginal, through greater application of plant nutrients, pesticides and water. In future years unique and innovated cultural practices are likely to emerge. The research objectives, then, are (1) to develop the capacity to identify, assess and predict the short term and long range environmental implications and impacts of existing and emerging techniques for increasing production of renewable resources at the local, regional and national levels, and (2) to develop methods to identify and investigate alternate cost-effective technology, management and institutional approaches, including socio-economic aspects, needed to minimize the environmental impacts resulting from increased food and fiber production. The trend assessment methodology must incorporate the impliactions of natural resources utilization and conservation, particularly energy sources, and be able to react to national and international political decisions impacting the changes in food and fiber production. The information generated will be used to permit timely and cost-effective response to environmental threats and identify environmental policy issues for EPA.

Laboratory Assignment: Robert S. Kerr Environmental Research Laboratory, Ada

Integrated Pest Management — 771E

Extramural Funds: $1,200,000

Accomplishment Plan Summary: The objective of this program is to develop optimized pest control strategies based upon detailed biological knowledge of the interactions between pests and crops which can be demonstrated to be economically acceptable to the agricultural community. The research will identify optimal combinations of non-chemical and chemical pest controls to reduce the environmental loading of undesirable chemicals. The program provides for the development of applicable pest control strategies and tactics for major pesticides using crop ecosystems which may permit marked reduction in dependence on use of pesticide chemcials as a regular agricultural pest management practice.

INDUSTRIAL PROCESSES PROGRAM AREA
RENEWABLE RESOURCES SUBPROGRAM

The major near term control strategy development effort will continue through interagency agreements or through regional grants let to a major grantee with several other subgrantees. After fiscal year 1978, program emphasis will shift toward integrated plant/insect pest control. Urban pest integrated pest management strategies research will be continued to meet the increasing Office of Pesticide Programs emphasis on the need. Research on insect pathogen controls and insect growth regulators will be reduced from present levels. Utility of research results by the user community will receive additional attention. The program will continue to be coordinated with other agencies. Operation of the research will continue to be on an extramural basis. This effort will comply with Section 20(a) and Section 4 (c) of the Federal Insecticide, Fungicide and Rodenticide Act (PL 92-516).

Laboratory Assignment: Office of Health and Ecological Effects, Headquarters

PUBLIC SECTOR ACTIVITIES PROGRAM AREA

This area contains many subprograms that are fundamental to EPA's responsibilities. These subprograms have been combined into a single program area, Public Sector Activities, because they are inter-related and therefore require similar personnel skills and equipment development. This research program focuses on pollution problems resulting from community, residential or other non-industrial activities; health effects from contaminated drinking water supplies; water treatment systems management; ground water management; and land use management studies. This program has three components — Waste Management, Water Supply, and Environmental Management.

WASTE MANAGEMENT

The Waste Management Subprogram provides technical information to support the Agency's operating programs in construction grants, comprehensive planning and solid and hazardous waste management. It includes research, development and demonstration in the areas of municipal and other non-industrial wastewater, land surface runoff and municipal solid waste.

Urban Runoff Pollution Control — 611A

Extramural Funds: $1,241,000

Accomplishment Plan Summary: The immediate technical approach will continue to concentrate on completing and reporting on ongoing projects as quickly as possible. Of particular note is taking advantage of the opportunity to reevaluate some of the "historical" projects and impose current program direction on them resulting in a more practical project output than would otherwise have been obtained. That is, some of these projects have had a head start on the technology and can accordingly satisfy current program objectives in a more timely and less costly manner than would otherwise be accomplished through new starts. Overall, the program will concentrate on a more accurate assessment of the pollution impact of combined sewer overflows and stormwater discharges. Along with this will be a more concerted effort toward development of non-structural technology to enable the establishment of cost and performance standards and specifications relating to specific best management practices.

Laboratory Assignment: Municipal Environmental Research Laboratory, Cincinnati

Wastewater Treatment Technology Program — 611B

Extramural Funds: $4,375,000

Accomplishment Plan Summary: Goals of the Federal Water Pollution Control Act (PL 92-500) require conventional and innovative processes to meet municipal effluent limitations of increasing efficiency as the 1985 no discharge goal is approached. To ease the socio-economic burden of implementing these goals, existing equipment must be upgraded, new cost effective technologies developed and energy and capital outlays reduced. Where possible, nonstructural types of treatment enhancement will be evaluated. A major and increasing area of concern is the environmental pollution by toxic metals and synthetic organic chemicals. One of the goals of this program is to produce information on the source of toxic pollutants, on the treatability by conventional and/or innovative technology and to provide cost analyses to enable the selection of the most cost-effective approach to preventing their dispersion. The goal of research in the sludge processing area is to develop and demonstrate the most cost effective technology for processing wastewater sludge in an ecologically satisfactory manner so that the

developed technology can impact design of plants being designed by 1980. The current energy situation makes it imperative that fuel consumption in sludge disposal be reduced and technologies developed for utilizing sludge for fuel and other beneficial purposes. The major goal of the reuse program is to verify and demonstrate the practicability of reusing municipal wastewater. Emphasis at this time is on direct and indirect reuse for domestic purposes. The goals to improve efficiency, reliability, cost effectiveness and to reduce energy sensitivity in municipal wastewater treatment are supported by research to improve operations and maintenance practices, to develop novel methods and materials for cost effective construction, to develop novel methods for energy conservation, and to develop instrumentation and central strategies for automation of wastewater treatment systems. Developments in these areas provide the cost-effectiveness and effluent quality assurance needed for effective water pollution control. In accordance with Section 104(q)(1) of PL 92–500, the research activities in small flows seek to conceive, study and demonstrate new and improved methods for abating pollution in rural areas. The overall approach is subdivided into four categories, i.e., onsite systems, collection methods, septage management, and rural treatment systems. The final result of these efforts will be practical handbooks or manuals addressing the costs, performance, operation and maintenance requirement, design considerations and environmental impact of alternative technologies studies.

Laboratory Assignment: Municipal Environmental Research Laboratory, Cincinnati

Application of Wastewater to Land (Soil Treatment Systems) — 611C

Extramural Funds: $596,000

Accomplishment Plan Summary: The scope of this program includes the development and field evaluation of new or improved control technology for the effective and economical treatment of municipal wastewater effluents through the use of the soil as a treatment medium and the application of aquaculture techniques utilizing fish and plant culture. Primary effort are to be directed to develop technologies for removal of nutrients, organic materials, and microorganisms. The potential for beneficial uses such as crop irrigation, animal grazing, fish production, soil conditioning, etc., and their compatibility with the basic treatment systems are to be evaluated. Definition of the technological factors for design, construction and operation of land application and agriculture systems must be produced. Treatment capability, health factors, groundwater protection, loading factors, potential for instrumentation and automation must be defined. Development and evaluation of alternative cost-effective processes with firmly established dependability must be considered as alternatives for a broad spectrum of plant sizes, flow rates, feed characteristics, and climatic zones.

In this program the soil treatment area is considered divided into two technology subprogram areas: (1) Soil treatment systems—effluent treatment, and (2) Aquaculture application to wastewater treatment. The ultimate objective of this soil treatment program is the publication and wide distribution of useful planning and design manuals with adequate operation and maintenance backup taking into consideration all of the interacting factors, e.g., soils, groundwater, chemical/biological systems, climate, facility design, cropping, socio-political-economic-legal, and health effects, as a total treatment system.

Periodically, interim planning and design manuals should be published. The timing will be a function of the generation of new design data which will prove useful to the designer. As definitive specialized projects are completed, e.g., phosphorus model, effect of climate on design, etc., these projects should be published for distribution as technical reports. Concise design sections should then be melded into the planning and design manual.

Laboratory Assignment: Robert S. Kerr Environmental Research Laboratory, Ada

Alaska Village Demonstration Projects — 611D

Extramural Funds: $222,000

Accomplishment Plan Summary: The objective of this program is to demonstrate methods to provide central community facilities for safe water and elimination or control of pollution in those native villages of Alaska lacking such facilities. The primary objective during fiscal year 1978 will be to complete the evaluation of the project at Wainwright with a final report fully documenting the results to be completed by October 1978. This report is to be prepared as a formal EPA Report to Congress.

Laboratory Assignment: Environmental Research Laboratory, Corvallis

Health Effects Interpretive Studies Associated With Land Application of Sludges — 611E

Extramural Funds. $200,000

Accomplishment Plan Summary: Conduct projects which will interpret the existing data base to provide guidance to Agency policy makers in support of the Municipal Sludge Management Program.

Laboratory Assignment: Health Effects Research Laboratory, Cincinnati

Land Application Site Monitoring — 611F

Extramural Funds: $150,000

Accomplishemnt Plan Summary: Conduct an assessment of literature to provide interim guidance to administrative (Federal, State and local) personnel on sludge-disposal-site-monitoring practices in accordance with the requirements of the "Proposed Technical Bulletin: Municipal Sludge Management: Environmental Factors," MCD-23.

Laboratory Assignment: Municipal Environmental Research Laboratory, Cincinnati

Technology Transfer Support of Municipal Sludge Management — 611G

Extramural Funds: $60,000

Accomplishment Plan Summary: In support of research and development in municipal sludge management, disseminate state-of-the-art reports of innovative technology in at least the areas of processing, stabilization, and land spreading concentrating especially on those technological advances (foreign and domestic) that have not been evaluated in the Municipal Environmental Research Laboratory program.

Laboratory Assignment: Environmental Research Information Center, Cincinnati

Solid and Hazardous Waste Management — 618A

Extramural Funds: $6,705,000

Accomplishment Plan Summary: Develop, through studies, research and demonstrations, the technologies necessary to achieve environmentally acceptable cost effective solid and hazardous waste management (generation through disposal) in which conservation and recovery of resources are prime considerations. Included in the objectives are: (1) development of new and improved methodology and/or equipment to identify and/or eliminate effects from waste disposal due to the release into the environment of materials present in solid and hazardous waste which would be adverse to the public health and welfare; (2) to evaluate, develop, and demonstrate new or improved methods for the reduction, separation, processing and recovery of resources, including energy; and (3) to establish a technical basis to support the Agency's efforts in developing guidelines and regulations for solid and hazardous waste management and the implementation of these guidelines and regulations by state and local governments and to the private sector.

The fiscal year 1978 program will focus efforts to: (1) improve methods for landfilling of solid waste, (2) alternative methods of waste disposal; (3) remedial action for minimizing the environmental impact of land disposal sites; (4) methods for processing or treating hazardous materials, and (5) recovery and reuse of waste materials.

Laboratory Assignment: Municipal Environmental Research Laboratory, Cincinnati

PUBLIC SECTOR ACTIVITIES PROGRAM AREA
WATER SUPPLY SUBPROGRAM

The Water Supply Subprogram includes research, development and demonstration activities relating to the provision of a dependably safe supply of drinking water and to the health effects resulting directly or indirectly from contaminants in drinking water. The research activities provide the technical information for the Agency's Water Supply Program which is conducted under the Safe Drinking Water Act (PL 92–523). 92–523).

Water Supply—Water Treatment and Systems — 614A

Extramural Funds: $4,901,000

Accomplishment Plan Summary: The ultimate objective of this program is to develop new or improved technology for the effective and economical control of drinking water contaminants during storage, treatment and distribution. Program efforts will be directed toward evaluating technologies for limiting potentially toxic contaminants and infectious agents so that the municipal sector will be able to achieve compliance with present and future primary drinking water standards. Improved methods of operating water supply facilities will be developed and evaluated, including development of indicator parameters for monitoring the efficacy of treatment. Specific attention will be given to the need of small water systems for innovative treatment methods.

Laboratory Assignment: Municipal Environmental Research Laboratory, Cincinnati

Water Supply Health Effects Research — 614B

Extramural Funds: $4,475,000

Accomplishment Plan Summary: Determine the nature and concentrations of organic, inorganic, and microbiological contaminants in water supplies. Evaluate through literature searches and short and long-term toxicological and epidemiological studies, the health effects of drinking water contaminants. Derive concentration limits necessary for the protection of the public health. Specific objectives will be to: (1) Develop the scientific basis for establishing, evaluating, and revising drinking water standards for organics. The most important work is on trihalomethanes, other disinfectant by-products, and concentrates from finished water. Other compounds are low priority, and work on any other individual organic compounds should be limited; (2) Develop the scientific bases for establishing, evaluating, and revising drinking water standards for inorganics; (3) Determine the occurrence and effects of microbiological contaminants in water supplies. These studies should include surveys for the occurrence of viruses and other pathogenic organisms, determinations of what diseases are or may be transmitted by drinking water and conditions which allow this to occur. The emphasis should begin reorienting from viruses toward other pathogens. ***Giardia*** is high priority; (4) Evaluate the potential health hazards associated with water reuse for domestic purposes. Determine the organic, inorganic and microbiological contaminants present in the effluent of an advanced waste treatment plant; and (5) Determine through toxicological and epidemiological studies the health effects of asbestos fibers of the type found in water supplies.

Laboratory Assignment: Health Effects Research Laboratory, Cincinnati

Water Supply—Ground Water Management — 614C

Extramural Funds: $1,030,000

Accomplishment Plan Summary: Although there is a need for a comprehensive national groundwater research program, to carry out one effectively would require significantly more resources both within EPA and elsewhere than are currently available or likely to be available in the near future. Therefore, this program should, as soon as possible, shift away from attempting to carry out a comprehensive groundwater research program. Rather, the program should concentrate on developing an overall groundwater strategy, which identifies the research which is of most significance to the Agency and which can be carried out with current and anticipated resources. At this time, we believe this means the program should direct its efforts towards providing a core of knowledge and expertise on groundwater quality which can provide technical advice and assistance to Agency programs through: (1) activities, including research, which assure a balanced staff capability which is continually abreast of all significant advances and on-going research on groundwater quality, (2) maintenance of continual assessment of current groundwater knowledge and technology, (3) dissemination of current technical information on a timely basis to Agency operating staff and other appropriate users, (4) identification of gaps in groundwater research and (4) selected short-term applied research studies to fill the gaps of most significance to the Agency.

Laboratory Assignment: Robert S. Kerr Environmental Research Laboratory, Ada

Water Supply Identification and Measurement — 614D

Extramural Funds: $770,000

Accomplishment Plan Summary: This Accomplishment Plan is part of an integrated program to develop techniques for identification and measurement of chemical constituents in water and soil.

Laboratory Assignment: Environmental Research Laboratory, Athens

Water Supply—Identification and Measurement — 614E

Extramural Funds: $200,000

Accomplishment Plan Summary: The Safe Drinking Water Act (PL 93–523), part 141, requires validation and standardization of measurement methodology to determine compliance with maximum contaminant levels. In the area of water supply, chlorination for purposes of disinfection has been shown to be capable of producing toxic chlorinated hydrocarbons during the treatment process. Thus other means of disinfection, i.e., ozonation, have been suggested as alternate methods. Such techniques require the development and application of instrumentation for the accurate measurement of these materials.

Laboratory Assignment: Environmental Monitoring and Support Laboratory, Cincinnati

PUBLIC SECTOR ACTIVITIES PROGRAM AREA
ENVIRONMENTAL MANAGEMENT SUBPROGRAM

The Environmental Management Subprogram focuses on the development of improved procedures for planning, implementing, enforcing, and assessing cost-effective environmental protection strategies for particular problem areas (air, water, etc.). One current objective is the development of a comprehensive planning procedure to permit integration of all environmental programs in an efficient manner, utilizing land use management as the basic integrating mechanism.

Environmental Management — 619A

Extramural Funds: $1,230,000

Accomplishment Plan Summary: The objective of this program is the development of a set of procedures and methods that can be used by environmental planning and management organizations to determine least-cost strategies and to evaluate their effects (physical, economic, administrative, social) when implemented. The intent of this objective is to develop a capability to evaluate a wide range of technological options (including non-structural methods) for environmental quality management, as well as consideration of alterntive incentives, both positive and negative, for implementation. Emphasis is on comprehensive and integrated (intermedia) management. The focus of the research program is on the region (metropolitan area, river basin, air shed, economic region), the level at which most environmental strategies are applied. Since the research products are intended primarily for decision-making by users in the field (state, regional, local agencies), many are in a handbook format.

In fiscal year 1978 two major initiatives will be undertaken. As a logical extension of the Regional Environmental Management Handbook and the Areawide Assessment Prcedures Manual, research will be initiated to develop an Environmental Systems Analysis Program. A companion effort to determine the feasibility of evaluating these previous environmental management program outputs among other methods, will be undertaken in an Environmental Systems Analysis Region. The other new initiative will be a program, jointly funded by the Council on Environmental Quality, to operationally develop new incentives (concentrating initially on economic incentives) for environmental management.

Laboratory Assignment: Municipal Environmental Research Laboratory, Cincinnati

MONITORING AND TECHNICAL SUPPORT PROGRAM AREA

This program includes both direct research activities and direct assistance and support to the rest of the Agency. It focuses on the development of reference or standardized environmental measurement and monitoring equipment, techniques and systems; quality assurance programs including validation of analytical procedures, sampling techniques, and methods to improve the quality of environmental monitoring data; provision of technical services to the Agency involving specialized expertise and facilities available in the Office of Research and Development; and a technical information dissemination program. The components of this program are the Measurement Techniques and Equipment Standardization, Characterization and Measurement Methods Development, Quality Assurance, and Technical Support.

MEASUREMENT TECHNIQUES AND EQUIPMENT STANDARDIZATION SUBPROGRAM

Measurement Techniques and Equipment Standardization involves development, evaluation and demonstration of field and laboratory measurement and monitoring methods and instrumentation. The objective of the program is to develop, test and evaluate equipment and methods that are applicable to measuring pollutants at the lowest environmentally significant ambient concentration as well as measuring the higher concentrations that occur at pollutant sources. Highest priority is given to developing methods to measure those pollutants that are presently regulated as well as those where regulations are anticipated. Over the long term, this program will develop, test and evaluate comprehensive methods and techniques for measuring pollutants in air and water as well as multi-media systems employing remote environmental monitoring techniques.

Monitoring Systems Development for Operation Applications — 620A

Extramural Funds: $317,000

Accomplishment Plan Summary: The basic objective of this effort is to develop cost-effective and efficient monitoring systems and techniques which will provide the information required by EPA in meeting its regulatory and enforcement roles under present and anticipated legislative mandates. This information will be obtained by application of improved and rapid monitoring techniques and approaches which will permit accurate assessments of the state of the environment so that timely decisions can be made regarding the presence and effects of regulated and nonregulated pollutants in the environment including toxic substances, carcinogens, and trace metals. Program emphasis will be on developing and demonstrating air and water quality measurement methodologies and systems, remote sensing techniques and instrumentation, monitoring network optimization guidelines and a system approach to environmental monitoring. Development of monitoring systems will include the design, fabrication and evaluation of advanced air and water contact remote monitoring instrumentation for detecting and quantifying environmental pollutants in these media. Emphasis will be on water quality monitoring procedures and systems for determining the contribution of various nonpoint pollutant sources to surface waters including agriculture, feedlots, silviculture and energy development related activities. The development of remote sensing techniques and systems will include developing, adapting, and evaluating remote sensing instrumentation for monitoring specific pollutants by their unique interaction with ambient or pulsed light.

MONITORING AND TECHNICAL SUPPORT PROGRAM AREA
MEASUREMENT TECHNIQUES AND EQUIPMENT STANDARDIZATION SUBPROGRAM

The development of optimization techniques and systematic approaches will permit clear identification and quantitative definition of the relationships between pollutant sources, their environmental pathways, and exposure to dose-response relationships of the critical receptor(s), i.e., population(s) at risk. These approaches include adaptation and refinement of available and state-of-the-art monitoring instrumentation and technology such as modeling concepts, biological methods, and the development of integrated (multimedia) monitoring concepts.

Laboratory Assignment: Environmental Monitoring and Support Laboratory, Las Vegas

MONITORING AND TECHNICAL SUPPORT PROGRAM AREA
CHARACTERIZATION AND MEASUREMENT METHODS DEVELOPMENT SUBPROGRAM

This subprogram focuses on providing approaches and measurement instrumentation for all pollutants (pesticides, toxic substances, industrial chemicals, petrochemicals, combustion products, etc.) in the air and in groundwater and surface waters. This program includes basic physical and chemical parameters of pollutants and the development and/or adaptation of instruments for detecting and quantifying pollutants.

Characterization and Measurement Methods Development — 712B

Extramural Funds: $3,306,000

Accomplishment Plan Summary: The air pollutant characterization and measurement effort is designed to respond to the needs associated with the detailed description of the composition and level of air contaminants. This level of detail is necessary to elucidate parameters such as: chemical and physical interference, environmental constraints, and end-use requirements. The output of this program is new and/or improved methodology and instrumentation technology which will be utilized for stationary source, mobile source, and ambient air requirements that will support the development and maintenance of Agency air quality goals.

The outputs of this activity are requisite to the achievement of sub-objectives associated with the generation of air contaminants, their transport, transformation, decay, and ultimatic sinks. This technology is basic for the determination of atmospheric effects, atmospheric chemical and physical processes and the development and evaluation of air quality simulation modeling.

Laboratory Assignment: Environmental Sciences Research Laboratory, Research Triangle Park

New and Improved Techniques for Identification and Measurement of Chemical Constituents of Water and Soils — 713B

Extramural Funds: $50,000

Accomplishment Plan Summary: This Accomplishment Plan responds to the major need for development of techniques for identification and measurement of chemical constituents in water and soil. Techniques should identify and measure chemicals representative of all classes of organic and inorganic substances, determining the elemental species of inorganic substances as well as identifying the elements. Standardized methodology is not developed; rather the fundamental techniques that ultimately go into standardized methods are evaluated for their applicability to the analysis of water, soils and commercial chemicals. Practically all outputs from this research will be used by Regional and State laboratories in compliance monitoring, enforcing regulations and investigating pollution incidents; by researchers in studying health and ecological effects, developing treatment technology, determining mechanisms of fate and transport and further developing the techniques for standardization; by industrial laboratories in self-monitoring and in new-product analysis for trace impurities and by Headquarters Offices who use the distribution of pollutants identified in setting priorities for regulation.

Laboratory Assignment: Environmental Research Laboratory, Athens

MONITORING AND TECHNICAL SUPPORT PROGRAM AREA
CHARACTERIZATION AND MEASUREMENT METHODS DEVELOPMENT SUBPROGRAM

Methodology for Concentration, Recovery, and Associated Solids — 713C

Extramural Funds: $200,000

Accomplishment Plan Summary: The objective of this program is to develop procedures for the detection and quantification of viruses in water and associated media. Rapid efficient field methods are sought for recovering viruses in a concentrated form ready for shipment to a central laboratory for assay. Identification procedures and more sensitive cell lines will also be sought. The methods and procedures developed should allow studies in health effects and transport and fate and monitoring activities to be conducted rapidly and effectively.

Laboratory Assignment: Environmental Monitoring and Support Laboratory, Cincinnati

MONITORING AND TECHNICAL SUPPORT PROGRAM AREA
QUALITY ASSURANCE SUBPROGRAM

Quality Assurance serves all environmental monitoring requirements of the Agency. Regulations and standards promulgated by the Agency require frequent and/or routine monitoring of ambient air, ambient water, marine waters, waste water discharges, public water supplies, emissions from stationary and mobile air pollution sources, lead and phosphorus in gasoline and special categories of toxic and hazardous materials. With few exceptions, monitoring of pollutants in these categories require use of standardized measurement methodology, as well as quality control procedures to assure the validity of the resulting data. This subprogram focuses on standardizing methods, providing standard reference materials and samples, developing quality control guidelines and manuals, conducting on-site evaluatio of analytical laboratories and inter-laboratory performance checks to assure that legally defensible data is produced by EPA laboratories. Additionally, this work includes studies of methods for laboratory accreditation, studies on automating laboratory instruments and data reduction and participation in regional quality control activities.

Quality Assurance — 621A

Extramural Funds: $65,000

Accomplishment Plan Summary: The objective of an air monitoring quality assurance research program is to develop and deliver tools and services to the air pollution monitoring community which will assure that air pollution monitoring data, both from the ambient air and from source emissions, are of known quality. Emphasis in the program shall be given to: (1) The development, validation, and standardization of reference and equivalent methods required for supporting regulatory standards, e.g., National Primary and Secondary Ambient Air Quality Standards, Standards of Performance for New Stationary Sources, and National Emission Standards for Hazardous Air Pollutants and methods needed to obtain data to develop new standards under these regulations. (2) The determination of the performance of agencies and programs collecting air monitoring data used in determining compliance with the above standards, or data having the potential to be used in the regulatory process. (3) Provision of technical assistance.

Laboratory Assignment: Environmental Monitoring and Support Laboratory, Research Triangle Park

Quality Assurance — 621A

Extramural Funds: $1,336,000

Accomplishment Plan Summary: The objective of the water quality and water supply quality assurance program is to develop and deliver to the customer programs those quality assurance tools and services which are necessary for making measurements under conditions which document the validity of the data generated. Documented validity of the data is of highest priority to customer programs in making reliable, unchallengeable decisions.

MONITORING AND TECHNICAL SUPPORT PROGRAM AREA
QUALITY ASSURANCE SUBPROGRAM

Emphasis shall be given to develop and deliver those reference methods, reference materials, and quality control procedures and guidelines which are required to support the Office of Water and Hazardous Materials, Office of Water Supply, Office of Water Planning and Standards, Office of Pesticides Programs, and the Office of Toxic Substances in developing or amending priority regulations such as the imminent regulations for toxic substances included in the list of substances included in the list of 65 categories of pollutants in the 1976 toxic water pollutant consent decree settlement agreement.

Laboratory Assignment: Environmental Monitoring and Support Laboratory, Cincinnati

Development and Operation of a Total Quality Assurance Program for Pesticide Residue Measurements — 621B

Extramural Funds: $95,000

Accomplishment Plan Summary: The objective of this program is to provide a total quality assurance program for pesticide residue measurements in biological materials such as blood, urine, adipose tissue, milk, soils and other substrates as required for the implementation of the Federal Insecticide, Fungicide, and Rodenticide Act (PL 92–56) and in human health effects studies related to toxic chemicals. It is of vital importance that all EPA pesticide laboratories in any given network maintain a rigid analytical quality control program to guarantee accurate and precise sample analyses. The reputation and testimony of laboratory personnel involved with pesticide analyses may be evaluated on the strength of the quality assurance program. To maintain such a program requires: (1) periodic interlab check samples; (2) provision of bulk samples of appropriate substrates suitable for use in intra quality control programs; (3) distribution of standardized materials important to successful analysis of pesticide residues; (4) provision of methodology which has been standardized through collaborative studies; (5) provision of consultation and instrumental analytical backup for unusually difficult problems; and (6) provision of training for laboratory personnel.

Laboratory Assignment: Health Effects Research Laboratory, Research Triangle Park

MONITORING AND TECHNICAL SUPPORT PROGRAM AREA
TECHNICAL SUPPORT SUBPROGRAM

Technical Support covers the scientific and technical services provided to the Agency and other organizations to solve immediate environmental problems through the use of the expertise of ORD personnel and specialized ORD facilities. Our effort in this area assures coordinated response to emergency or short term requirements as well as provision, on a more routine basis, of services for which ORD has a unique or particularly cost effective capability. Examples of these services include conducting trace element analyses of National Air Sampling Network samples, analyses of the Fuels Surveillance Network samples, and the maintenance of a capability to conduct aerial surveillance and monitoring as well as capability to assess point and non-point sources of pollution from aerial photographs.

Also included in the Technical Support Subprogram is the Minority Institutions Research Support program (MIRS). This activitiy stimulates minority institutions to develop the capability to conduct environmental research. Minority institutions that have or can develop the capability to conduct effective environmental research are actively sought, advised on preparation of grant applications and encouraged to submit them.

This subprogram was established in fiscal year 1976 and is responsible for managing and coordinating the effective dissemination and transfer of the findings and products of the research and development program to a variety of dependent users both within the Agency and throughout the public and private sectors. The program involves the entire range of general scientific and technical information dissemination activities including such normal activities as the publication and general distribution of scientific and technical reports and responding to requests for specific information or publications. Primary emphasis, however, is placed on an aggressive program of active information dissemination. This aspect of the program utilizes proven marketing techniques in matching available information or technology with the expressed needs of particular user groups such as local community decision officials who frequently do not possess technical or scientific backgrounds. Appropriate information transfer products are then developed in a form designed to be most useful and readily understandable to the targeted user.

Technical Support (Water Quality) — 613A
Technical Support (Interdisciplinary) — 622A

Extramural Funds: $608,000

Accomplishment Plan Summary: The objective of the Water Quality and Interdisciplinary Technical Support Programs is to provide support to Agency operating programs to enable them to fulfill the objectives of the Agency's mandates. Technical support is defined as the application of knowledge in the current state-of-the-art or knowledge derivable from it to solve, or to assist in solving, the immediate problems of the Agency. Technical Support services typically fall into the following categories: (1) Responding to scheduled, unscheduled and emergency requirements for field, analytical, and data analysis support to produce data of known quality through specialized field and analytical studies, organizing this data into summaries and providing interpretive reports; (2) Adapting and modifying basic state-of-the-art techniques to gather empirical evidence of environmental levels of specified or suspected pollutants; (3) Performing complex chemical and physical analyses; (4) Testifying as expert witnesses at administrative and judicial procedings; and (5) Consultations.

MONITORING AND TECHNICAL SUPPORT PROGRAM AREA
TECHNICAL SUPPORT SUBPROGRAM

Although ORD is only one of many organizations providing technical support service to operating programs, it is unique in that it has the broadest spectrum of technical expertise and scientific equipment readily available within the Agency. Since ORD's technical support capability is basically derived from its research activities, it is a management objective that the ORD personnel dedicated to technical support services and those engaged in research activities work side-by-side in ORD laboratories to ensure awareness of the latest state-of-the-art knowledge among all technical personnel.

Laboratory Assignment: Environmental Monitoring and Support Laboratory, Las Vegas
Environmental Monitoring and Support Laboratory, Cincinnati

Minority Institutions Research Support Program — 622B

Extramural Funds: $530,000

Accomplishment Plan Summary: The objectives of the Minority Institutions Research Support Program are: (1) To identify existing and potential environmental research capability within minority institutions and assist these institutions in utilizing this capability to participate in EPA research activities; (2) To help minority institutions become more competitive with other institutions for research funds; (3) To award research grants or contracts to minority institutions in a manner that will support the research objectives of the Agency; and (4) To promote good working relationships between the Agency and participating institutions.

Laboratory Assignment: Office of Monitoring and Technical Support, Headquarters

Technical Information Program — 622C

Extramural Funds: $1,990,000

Accomplishment Plan Summary: The principal objective of the Environmental Research Information Center (ERIC) is to implement a comprehensive national program for the effective dissemination and transfer of environmentally related scientific/technical information and technology. The basic mission of the program is to assure that all scientific and technical personnel have ready access to essential information and data required to support the conduct of ORD programs and that the findings, conclusions and products which are developed as a result of these programs are appropriately documented, packaged, disseminated and transferred in a timely manner and in a form most useful to environmental decision officials and other important use: groups both within and external to the Agency. In discharging these responsibilities, the Center shall provide leadership, guidance, coordination and technical expertise to ORD and other Agency components as well as direct implementation of technical/scientific information dissemination and technology transfer activities.

In fiscal year 1978, the scope of the Technical Information Program will be expanded to encompass the dissemination and transfer of an entire spectrum of ORD developed technology and technical information. Work initiated during fiscal year 1977 in the areas of land treatment, municiapl waste treatment, industrial pollution control technology, non-point sources, water supply, monitoring technology and energy R&D will be continued on a priority basis. New effort will include the dissemination and transfer of ORD outputs in the areas of health effects, ecological effects and toxic substances. Specific support services tobe provided by ERIC for ORD and other Agency components will include but not be limited to: processing, publication and distribution of technical/scientific publications, information booklets, newsletters, etc., graphic arts and technical editing

services; planning, implementation, coordination and maintenance of special information systems and data bases; and response to both internal and external requests for technical information.

Laboratory Assignment: Environmental Research Information Center, Cincinnati

PART III

Office of Research and Development's Grant and Contract Activities*/

While some of the research required by these Accomplishment Plans will be done in-house by ORD's staff, much of the research is planned for accomplishment by grant, contract, or interagency agreement. The Laboratory Director decides how the goals of the Accomplishment Plan can best be achieved. This project level planning is documented in Work Plans. The Work Plans describe each project or task required to accomplish the research objective, indicate how the task will be implemented (i.e., grant, contract, in-house), and estimate the amount of dollars required to complete the task.

All planned contracting is carried out competitively with notices of the availability of Request for Proposal (RFP) documents publicly advertised. Unsolicited contract proposals should *not* be submitted for such projects. The review/selection procedures followed may vary slightly from project to project, but all pertinent information regarding both the project objectives and criteria for evaluation of proposals will be included in each RFP package. The Laboratory Director should not be contacted for information on contracts that have been advertised since such communication may conflict with Federal Procurement Regulations and could serve to disqualify a prospective contractor from further consideration.

With regard to all grant projects, contact with the cognizant Laboratory Director is encouraged. The Laboratory Director will generally be the individual responsible for making the award/reject recommendation on individual proposals.

*/Note: Information on other EPA grant programs is presented in the publication "Grant Assistance Programs of the Environmental Protection Agency", available from EPA's Grants Administration Division, Washington, DC 20460. Information on contracting procedures and policies is presented in the booklet, "Contracting with EPA — A Guide for Prospective Contractors", available from EPA's Contracts Management Division, Washington, DC 20460.

Guidelines For Submission Of Grant Applications Or Contract Proposals

A. Solicited contract proposals –

Requests for Proposals (RFP's) for all planned contracts will be advertised in the Commerce Business Daily issued by the U.S. Department of Commerce. A subscription to this publication may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402. These advertisements will provide instructions for obtaining RFP packages from EPA's Contracts Management Division. Each RFP package will include detailed information describing the form and context of proposals to be submitted as well as the required time and place of submission.

EPA's Contracts Management Division publishes "Contracting With EPA – A Guide for Prospective Contractors" to assist the business community in its efforts to find new markets in the Environmental Protection Agency. This publication includes the names and addresses of contracting offices in EPA and the Office of Research and Development laboratories, the types of products and services procured, general information about the Agency, and hints to aid businessmen in selling to EPA.

B. Unsolicited contract proposals –

While most of ORD's contract research and demonstration is conducted through the use of RFP's to solicit proposals (item A above), contracts can also be awarded on the basis of unsolicited proposals which meet the sole-source requirements of the Federal Procurement Regulations. Unsolicited contract proposals should be addressed to the Grants Administration Division (PM-216), Environmental Protection Agency, Washington, DC 20460. While no specific format is required, such proposals should generally contain:

1. Name, address and telephone number of the organization or individual submitting the proposal.
2. Date of preparation or submission.
3. Type of organization (profit, non-profit, educational, individual, other).
4. Concise title.
5. Project objective.
6. Need, utility and significance of project.
7. Scope of work, i.e., an outline and discussion of the purpose of proposed effort of activity, the method of attacking the problem, and nature and extent of anticipated results.
8. Experimental data developed by feasibility studies previously completed.
9. Estimated duration of the project, proposed starting and completion dates.
10. Scientific or technical references.
11. Names of key personnel to be involved, brief biographical information, including principal publications and relevant experience.
12. Equipment, facilities and personnel requirements.

13. Proposed budget, including separate cost estimates for salaries and wages, equipment, expendable supplies, services, travel, subcontracts, other direct costs and overhead.

EPA's Appropriation Act specifically provides that cost sharing must be included in contracts resulting from proposals for projects not specifically solicited. The extent of the cost sharing by the recipient will be decided after the proposal has been reviewed and determined to be of mutual interest to the grantee or contractor and the government.

The material submitted should contain both a *technical* and a *business* proposal. The *technical* proposal should clearly define the unique concept involved (as required for sole-source procurements) and include a plan for turning the concept into reality. It is suggested that the technical proposal identify any proprietary aspects of the proposed ideas or process. The *business* proposal should include a detailed cost proposal, information concerning past Government contracts, and any special terms and conditions desired.

C. Research or demonstration grant applications –

Pre-application activity —

Although grant applications may be submitted at any time and on any subject, potential grantees should take the following actions prior to submission of a formal grant application in order to save time and effort both for the applicant and EPA.

1. Review OR&D's current research program, as described in Part II, to determine if funds are available in the specific area of interest; and

2. Contact the appropriate research and development personnel cited in this document to ascertain if a grant project is planned prior to submission of an official grant application.

Submission of a preproposal is also strongly encouraged. The preproposal should be sent directly to the cognizant Laboratory Director listed in Part II of this document for review. A preproposal should normally consist of a three or four-page narrative outlining the project concept and containing the following information:

1. **Objective** – a clear statement of the specific objective is necessary. If the objective is designed to fulfill a specific project (as identified in Step 1 above), the project should be identified. If the objective cannot be associated with any specific project, some statement of the presumed value to EPA of attaining the research objective should be made.

2. **Project Plan** – a brief description of the research/development/demonstration concept and the plan for execution of the proposed project, including a projected time-schedule for accomplishments of intermediate outputs or key occurrences indicating progress (milestones) and the final objective.

3. **Budget** – a preliminary estimate of total costs which will be incurred in order to complete the project. Also, the share of the costs which will be provided by the applicant should be indicated.

4. **Staff and Facilities** – a brief listing of key project staff and capabilities and a brief description of any special facilities or other factors which would contribute to the success of the project. A single person who will have responsibility for planning, coordinating, and supervising the project should be identified along with the fraction of his time to be devoted to the project.

Following review and evaluation of the preproposal by the cognizant Laboratory Director, the prospective applicant will be advised whether (a) an application should be submitted for formal review, (b) submission of a modified preproposal is suggested, (c) possible submission of the preproposal to another Agency, Department, or source of funds is suggested, or (d) further pursuit of the particular topic is discouraged.

Formal applications —

All formal grant applications are to be submitted to the Grants Administration Division, Environmental Protection Agency, Washington, DC 20460. After formal "logging in" and acknowledgement, those applications falling within the Office of Research and Development's purview are referred to the appropriate ORD program office for program relevance review by the cognizant Laboratory Director. This review quickly screens out those applications for which EPA has no authority or interest or those for which no funds are available. For those proposals in which ORD has an interest, scientific/technical merit reviews are then conducted by *both* in-house and extramural experts. Extramural reviews are obtained in the National Science Foundation fashion — individual written reviews submitted by mail. Comments are also obtained from the Regional Office in the Region where the applicant is located and where the project would be conducted to determine the relationship of the proposed project to Regional programs and policies.

The individual coordinating the scientific/technical merit review (normally the cognizant Laboratory Director) assembles and evaluates both intramural and extramural review comments and prepares a recommendation for action on each application. The recommendation may be to award a grant, to reject the application, or to attempt to negotiate with the applicant to modify the scope of work. In those cases where the proposed scope of work could be modified in order to relate more directly to EPA's objectives and thereby qualify for funding, direct contact is made with the applicant to determine whether or not acceptable adjustments in the scope of work can be made.

APPENDIX A

OFFICE OF RESEARCH AND DEVELOPMENT

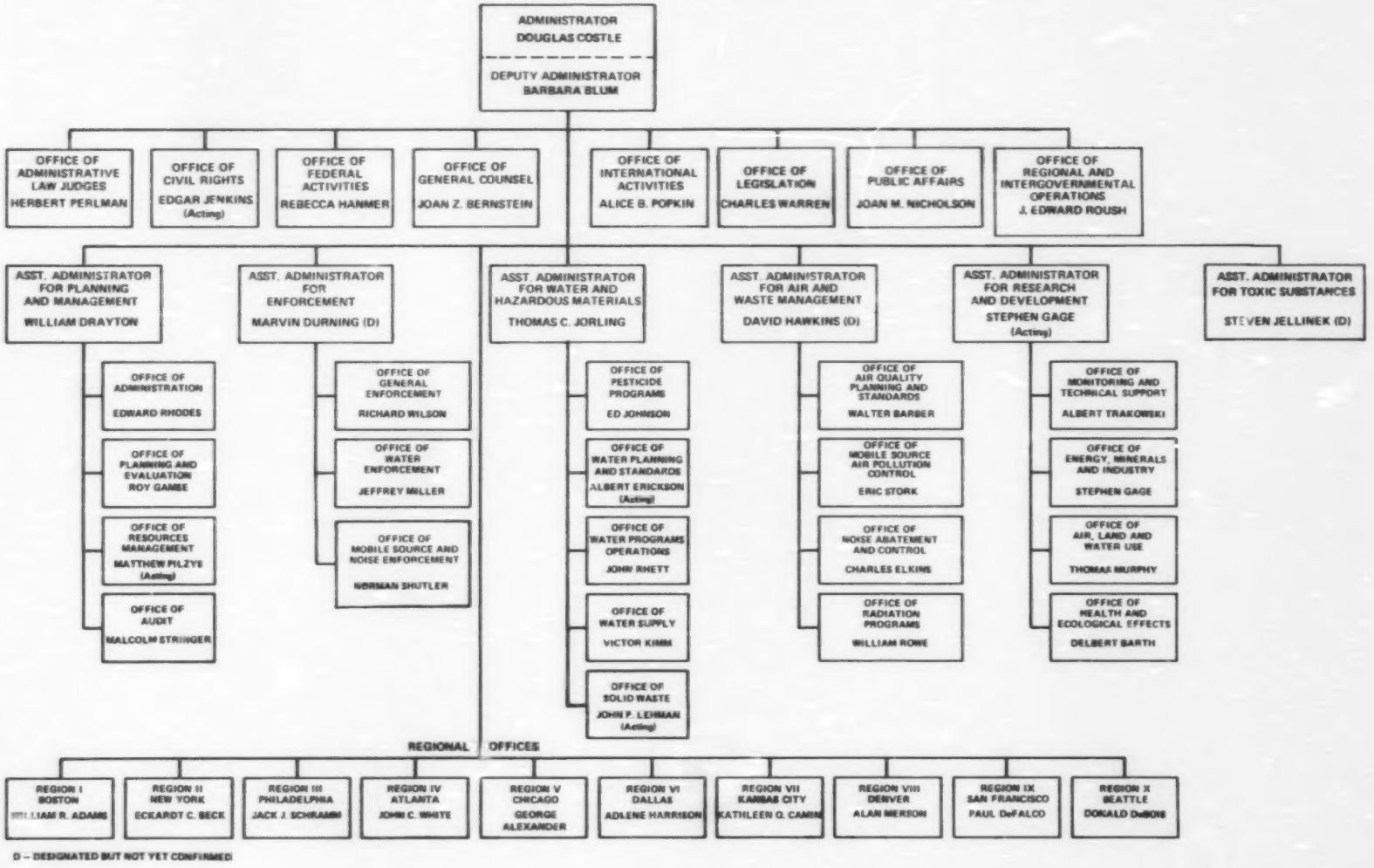
PROGRAM-BUDGET STRUCTURE AND CODES

Program Code	Component Title
	AIR
1AA	**Health and Ecological Effects**
1AA601	Health Effects
1AA602	Ecological Processes and Effects
1AA603	Transport and Fate of Pollutants
1AA751	Stratospheric Modification
1AB	**Industrial Processes**
1AB604	Minerals Processing and Manufacturing Industries
1AD	**Monitoring and Technical Support**
1AD605	Measurement Techniques and Equipment Standardization
1AD712	Characterization and Measurement Methods Development
1AD606	Technical Support
	WATER QUALITY
1BA	**Health and Ecological Effects**
1BA607	Health Effects
1BA608	Ecological Processes and Effects
1BA609	Transport and Fate of Pollutants
1BB	**Industrial Processes**
1BB610	Minerals Processing and Manufacturing Industries
1BB770	Renewable Resources
1BC	**Public Sector Activities**
1BC611	Waste Management
1BD	**Monitoring and Technical Support**
1BD612	Measurement Techniques and Equipment Standardization
1BD713	Characterization and Measurement Methods Development
1BD613	Technical Support
	WATER SUPPLY
1CC	**Public Sector Activities**
1CC614	Water Supply
	SOLID WASTE
1DC	**Public Sector Activities**
1DC618	Waste Management

Program Code	Component Title
	PESTICIDES
1EA	**Health and Ecological Effects**
1EA615	Health Effects
1EA714	Ecological Processes and Effects
1EB	**Industrial Processes**
1EB771	Renewable Resources
	RADIATION
1FA	**Health and Ecological Effects**
1FA628	Health Effects
	INTERDISCIPLINARY
1HA	**Health and Ecological Effects**
1HA630	Health Effects
1HA616	Ecological Processes and Effects
1HC	**Public Sector Activities**
1HC619	Environmental Management
1HD	**Monitoring and Technical Support**
1HD620	Measurement Techniques and Equipment Standardization
1HD621	Quality Assurance
1HD622	Technical Support
	TOXIC SUBSTANCES
1LA	**Health and Ecological Effects**
1LA629	Health Effects
1LA715	Ecological Processes and Effects
1LA760	Transport and Fate of Pollutants
1LB	**Industrial Processes**
1LB764	Minerals Processing and Manufacturing Industries
1LD	**Monitoring and Technical Support**
1LD761	Measurement Techniques and Equipment Standardization
1LD762	Characterization and Measurement Methods Development
1LD763	Technical Support
	ENERGY
1NE	**Energy**
1NE623	Extraction and Processing Technology
1NE624	Conservation and Utilization Technology Assessment
1NE625	Health and Ecological Effects
1NE626	Technical Support

APPENDIX B

U. S. ENVIRONMENTAL PROTECTION AGENCY



D – DESIGNATED BUT NOT YET CONFIRMED

APPENDIX C

EPA OFFICIALS AND REGIONAL CONTACTS

	Telephone*	States Served
Administrator **Douglas Costle** Environmental Protection Agency A – 100 Washington, DC 20460	(202) 755–2700	
Deputy Administrator **Barbara Blum** Environmental Protection Agency A – 100 Washington, DC 20460	(202) 755–2711	
Office of Regional and Intergovernmental Operations **J. Edward Rousch** Environmental Protection Agency A – 101 Washington, DC 20460	(202) 755–0444	
Region I		
Environmental Protection Agency Room 2203 John F. Kennedy Federal Building Boston, Massachusetts 02203		Connecticut Maine Massachusetts New Hampshire Rhode Island Vermont
Regional Administrator William R. Adams, Jr.	(617) 223–7210	
Deputy Regional Administrator Kenneth Johnson	(617) 223–7210	
Public Affairs Director Paul G. Keough	(617) 223–4704	
R&D Contact Richard Keppler	(617) 223-3477	

	Telephone*	States Served
Region II		
Environmental Protection Agency Room 1009 26 Federal Plaza New York, New York 10007		Delaware New Jersey New York Puerto Rico
Regional Administrator Eckardt C. Beck	(212) 264–2525	
Deputy Regional Administrator Eric B. Outwater	(212) 264–0396	
Public Affairs Director James Marshall	(212) 264–2515	
R&D Contact Robert W. Mason	(212) 340–6782	
Region III		
Environmental Protection Agency Curtis Building 6th & Walnut Streets Philadelphia, Pennsylvania 19106		District of Columbia Maryland Pennsylvania West Virginia Virginia
Regional Administrator Jack J. Schrann	(215) 597–9814	
Deputy Regional Administrator Alvin R. Morris	(215) 597–9814	
Congressional and Public Affairs Director Diane Margenau	(215) 597–9370	
R&D Contact Albert Montague	(215) 597–9856	

	Telephone*	States Served
Region IV		
Environmental Protection Agency 345 Courtland Street, N.E. Atlanta, Georgia 30308		Alabama Florida Georgia Kentucky Mississippi South Carolina Tennessee
Regional Administrator John C. White	(404) 881–4727 CML 257–4727 FTS	
Deputy Regional Administrator John A. Little	(404) 881–4727 CML 257–4727 FTS	
Public Affairs Director Charles D. Pou	(404) 881–3004 CML 257–3004 FTS	
R&D Contact Edmond Lomasney	(404) 881–5458 CML 257–3012 FTS	
Region V		
Environmental Protection Agency 230 S. Dearborn Chicago, Illinois 60604		Illinois Indiana Michigan Minnesota Ohio Wisconsin
Regional Administrator George R. Alexander, Jr.	(312) 353–2000	
Deputy Regional Administrator Valdas V. Adamkus	(312) 353–2000	
Public Affairs Director Frank M. Corrado	(312) 353–2072	
R&D Contact Clifford Risley, Jr.	(312) 353–2200	

	Telephone*	States Served
Region VI		
Environmental Protection Agency 1201 Elm Street First International Building Dallas, Texas 75270		Arkansas Louisiana New Mexico Oklahoma Texas
Regional Administrator Adlene Harrison	(214) 749–1962	
Deputy Regional Administrator (Vacant)		
Public Affairs Director Betty Williamson	(214) 749–1151	
R&D Contact Mildred Smith	(214) 749–3971	
Region VII		
Environmental Protection Agency 1735 Baltimore Avenue Kansas City, Missouri 64108		Iowa Kansas Missouri Nebraska
Regional Administrator Kathleen Camin	(816) 374–5493 CML 758–5493 FTS	
Deputy Regional Administrator Charles V. Wright	(816) 374–5493 CML 758–5493 FTS	
Public Affairs Director Rowena Michaels	(816) 374–5894 CML 758–5894 FTS	
R&D Contact Aleck Alexander	(816) 374–2921 CML 758–2921 FTS	
Region VIII		
Environmental Protection Agency Suite 900 1860 Lincoln Street Denver, Colorado 80203		Colorado Montana North Dakota South Dakota Utah Wyoming
Regional Administrator Alan Merson	(303) 837–3895 CML 327–3895 FTS	
Deputy Regional Administrator Roger L. Williams	(303) 837–3895 CML 327–3895 FTS	

	Telephone*	States Served
Public Affairs Director Howard W. Kayner	(303) 837–4904 CML 327–4904 FTS	
R&D Contact John E. Hardaway	(303) 837–3849 CML 327–5914 FTS	

Region IX

Environmental Protection Agency 100 California Street San Francisco, California 94111		Arizona California Hawaii Nevada
Regional Administrator Paul DeFalco, Jr.	(415) 556–2320	
Deputy Regional Administrator (Vacant)	(415) 556–2320	
Chief, Office of External Relations David L. Calkins	(415) 556–6266	
R&D Contact William Bishop	(415) 556–6925	

Region X

Environmental Protection Agency 1200 6th Avenue Seattle, Washington 98101		Alaska Idaho Washington Oregon
Regional Administrator Donald P. DuBois	(206) 442–1220 CML 399–1220 FTS	
Deputy Regional Administrator L. Edwin Coate	(206) 442–1220 CML 399–1220 FTS	
Office of Public Awarness Donald Bliss	(206) 442–1203 CML 399–1203 FTS	
R&D Contact Robert Courson	(206) 442–1296 CML 399–1296 FTS	

*Telephone numbers are both commercial and FTS unless otherwise indicated.

APPENDIX D
MAILING LIST FORM

Complete this form and return it to the address listed below if you wish your name added to the FY-79 Program Guide mailing list.

_____

Individual Contact and Title

_____

Name of Organization

_____

Street Address

_____

City State Zip

Complete the above information and mail to:

Office of Financial and Administrative Services (RD-674)
Office of Research and Development
Environmental Protection Agency
Washington, DC 20460

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